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ANNOUNCEMENT OF THE TWENTIETH SUMMER SESSION JULY 6–AUGUST 16 1911

APRIL 1, 1911
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ITHACA, NEW YORK

CALENDAR

In order to get the full number of exercises announced for the session, it is necessary that all work begin promptly on Thursday morning, July 6. Students are therefore urged to reach Ithaca in time to be present at the first exercises in each class. If possible, they should register on Wednesday; if not, they should register on Thursday during the hours not occupied in class work.

July 5, Wednesday, 9 a. m. to 5 p. m.—Registration at Office of Registrar, Morrill Hall.

July 6, Thursday.—Instruction begins at times and places announced under each course. Registration continued.

July 6, Thursday, 8 p. m., and following Thursdays, Musical Recital, Sage Chapel.

July 10, Monday, 8 p. m.—First Lecture in Monday evening course. Continued on following Mondays. Rockefeller Hall.

July 11, Tuesday before 5 p. m.—Last day for the payment of fees at the Treasurer's Office, 1 Morrill Hall.

July 11, Tuesday, 8 p. m., and following Tuesdays, Musical Recital, Sage Chapel.

July 12, Wednesday, 8 p. m., and following Wednesdays, Departmental Conferences.

July 15, Saturday, and following Saturdays.—Excursions of different departments as may be announced.

August 15, 16, Tuesday and Wednesday.—New York State Examinations for Teachers' Certificates.

August 16, Wednesday.—Summer Session closes.

CORNELL UNIVERSITY, SUMMER SESSION 1911

OFFICERS

Jacob Gould Schurman, LL.D., President of the University.
George Prentice Bristol, A.M., Director of the Summer Session.
David Fletcher Hoy, M.S., Registrar of the University.

FACULTY

The members of the faculty are, except where the contrary is indicated, regular members of the Cornell University staff of instruction.

Arthur J. Abbott, Director of Music, Manchester, N. H. — Music
Joseph Quincy Adams, Jr., Ph.D., Assistant Professor of English. — English
Arthur Augustus Allen, M. A., Instructor in Zoology. — Zoology
Ross Peter Anderson, A.B., Assistant in Chemistry. — Chemistry
Elmer James Bailey, Ph.D., Instructor in English. — English
John Bauer, Ph.D., Assistant Professor of Economics. — Economics
Charles Edwin Bennett, Litt.D., Professor of Latin. — Latin
Charles Ernest Bennett, A.B., Instructor in Latin. — Latin
Madison Bentley, Ph.D., Assistant Professor of Psychology. — Psychology
Ernest Blaker, Ph.D., Assistant Professor of Physics. — Physics
Smiley Blanton, B.S., Instructor in Oratory. — Public Speaking
Albert William Boesche, Ph.D., Assistant Professor of German. — German
Edwin Garrigues Boring, Assistant in Psychology. — Psychology
Harry Bates Brown, A.M., Instructor in Botany. — Botany
Arthur Wesley Browne, Ph.D., Professor of Chemistry. — Chemistry
Laura Bryant, Supervisor of Music, Ithaca Public Schools. — Music
George Lincoln Burr, LL.D., Professor of Medieval History. — History
Walter Buckingham Carver, Ph.D., Assistant Professor of Mathematics. — Mathematics
George Everet Condra, Ph.D., Professor of Geography and Geology, University of Nebraska. — Geography
Edward Godfrey Cox, Ph.D., Instructor in English. — English
Clyde Firman Craig, Ph.D., Instructor in Mathematics. — Mathematics
Hollis Ellsworth Dann, Mus. D., Professor of Music. — Music
Hermann Christian Davidsen, Ph.D., Assistant Professor of German. — German
Charles DeGarmo, Ph.D., Professor of Education. — Education
Donald Derickson, C.E., Assistant Professor of Civil Engineering. — Civil Engineering
Edwin Alfred Filmer, Assistant in Geography. — Geography
Ludwig Reinhold Geissler, Ph.D., Instructor in Psychology. — Psychology
Roswell Clifton Gibbs, A.M., Instructor in Physics. — Physics
David Clinton Gillespie, Ph.D., Instructor in Mathematics. — Mathematics
Arthur Gordon, Ph.D., Assistant Professor of Romance Languages. — Spanish
J. Earl Griffith, Head of Department of Art, High School of Commerce, Cleveland, Ohio. — Industrial Education

Othon Goepp Guerlac, Licencié ès lettres. Assistant Professor of Romance Languages. French
Layton S. Hawkins, A.M., Head of Department of Science, State Normal School, Cortland. Nature Study
John Jerome Hayes, Teacher of Singing, New York City. Music
Walter Liston Head, Foreman of Forge Shop Industrial Education
Emmet Francis Hitch, A.M., Assistant in Chemistry. Chemistry
Leroy Hooper, Assistant in Pattern Shop. Manua Training
Arthur Earl Houlehan, A.B., Assistant in Chemistry. Chemistry
Burdett Newton Howe, Assistant in Machine-Shop. Manual Training
Andrew Hunter, M.A., Assistant Professor of Biochemistry. Physiology
John Irwin Hutchinson, Ph.D., Professor of Mathematics. Mathematics
Edward Francis Johnston, University Organist. Music
Edwin Walter Kemmerer, Ph.D., Professor of Economics and Finance. Economics
Dexter Simpson Kimball, A.B., Professor of Machine Design. Industrial Education
Edwin Asbury Kirkpatrick, Ph.D., Director, Child Study Department, Fitchburg State Normal School, Mass. Education
Burton Judson Lemon, A.B., Instructor in Chemistry. Chemistry
Frederick W. C. Lieder, Ph.D., Instructor in German, Harvard University. German
Gustav Ernst F. Lundell, Ph.D., Instructor in Chemistry. Chemistry
Fred McAllister, Instructor in Botany. Botany
Edwin Eugene McCready, Supervisor of Manual Training, Syracuse, N. Y. Industrial Education
Alexander Dyer MacGillivray, Ph.D., Assistant Professor of Entomology. Entomology
William Judson Marsh, A.B., Assistant in Chemistry. Chemistry
James Frederick Mason, A.B., Instructor in Romance Languages. French
Harry Welday Mayes, B.S., Instructor in Physiology. Physiology
Fred A. Molby, Ph.D., Instructor in Physics. Physics
George Sylvanus Moler, B.M.E., Assistant Professor of Physics. Physics
Benton Sullivan Monroe, Ph.D., Instructor in English. English
Edward Payson Morton, Ph.D., Associate Professor of English, Wake Forest College, N. C. English
Carleton Chase Murdock, Ph.D., Instructor in Physics. Physics
Everett Ward Olmsted, Ph.D., Professor of Romance Languages. French
William Ridgeley Orndorff, Ph.D., Professor of Organic and Physiological Chemistry. Chemistry
Frederic William Owens, Ph.D., Instructor in Mathematics. Mathematics
Irving Perrine, A.B., Instructor in Geology. Geology
Addison Brown Poland, Ph.D., Superintendent of Schools, Newark, N. J. Education
Miles Albion Pond, Ph.B., Assistant Professor of Civil Engineering. Descriptive Geometry
Paul Russel Pope, Ph.D., Assistant Professor of German. German
Arthur Ranum, Ph.D., Assistant Professor of Mathematics. Mathematics

Edwin Frederick Rathjen, Ph.D., Assistant in Chemistry. Chemistry
Harry Westfall Redfield, B.S., Instructor in Chemistry. Chemistry
Hugh Daniel Reed, Ph.D., Assistant Professor of Zoology. Zoology
Ernest William Rettger, Ph.D., Assistant Professor of Applied Mechanics. Mechanics
Floyd Karker Richtmyer, A.B., Instructor in Physics. Physics
Harold Eaton Riegger, A.B., Assistant in Chemistry. Chemistry
Flora Rose, M.A., Lecturer in Home Economics. Domestic Science
Willard Winfield Rowlee, D.Sc., Professor of Botany. Botany
Elsie Sameth, Teacher of Physical Training, New York City. Physical Training
Francis Joseph Seery, B.S., Assistant Professor of Civil Engineering. Hydraulic Engineering
Francis Robert Sharpe, Ph.D., Assistant Professor of Mathematics. Mathematics
John Sanford Shearer, Ph.D., Professor of Physics. Physics
Fred Floyd Shetterly, Ph.D., Instructor in Chemistry. Chemistry
Henry Augustus Sill, Ph.D., Professor of Ancient History. History
Virgil Snyder, Ph.D., Professor of Mathematics. Mathematics
James Storrer, Assistant in Geology. Geology
Anna Clegg Stryke, A.B., Assistant in Entomology. Zoology
Leslie Thompson Sutherland, A.B., Assistant in Chemistry. Chemistry
Newton Swift, Teacher of Theory and Piano, Boston, Mass. Music
Thomas Tapper, Lecturer, Institute of Musical Art, New York City. Music
James Eugene Vanderhoef, Foreman in Foundry. Manual Training
Martha Van Rensselaer, A.B., Lecturer in Home Economics. Domestic Science
Oscar Diedrich von Engeln, A.B , Instructor in Physical Geography. Geography
Thomas Whitney Benson Welsh, A.B., Instructor in Chemistry. Chemistry
Albert Edward Wells, Superintendent of Shops. Industrial Education
John Tamsh Williams, Instructor in Machine Design. Industrial Education
Wilford Murray Wilson, M.D., Professor of Meteorology. Meteorology
James Albert Winans, A.M., Assistant Professor of Oratory and Debate. Public Speaking
Harry Emsley Wood, Supervisor of Manual Training, Indianapolis, Ind. Industrial Education
James Albert Woodburn, Ph.D., Professor of History and Political Science, Indiana University. History and Political Science
Albert Hazen Wright, Ph.D., Instructor in Vertebrate Zoology. Zoology
Wesley Daniel Zinnecker, Instructor in German. German

OBJECT OF THE SUMMER SESSION

The primary object of the Summer Session is to advance education by helping those engaged in it. The instruction is adapted to the needs of the following classes.

1. Professors and teachers in colleges and schools, superintendents, and supervisors of special branches of instruction.

The announcements of the different departments show a wide range of work. This work is either advanced and therefore suited for specialists who wish to pursue their individual study, or more elementary and adapted to teachers who desire to start in a new field. In addition to the instruction of the class room, the University's libraries, laboratories, and shops are open for use. For superintendents and supervisors, there are also courses in administration, and in general and special methods, besides lectures on educational philosophy and theory.

2. College students in Cornell or other universities who wish to use some of the "long vacation". In the case of graduates some of the work offered may be counted toward an advanced degree. Undergraduates may anticipate work and thereby shorten their course, or may make up existing deficiencies. The conditions for receiving credit, and the amount which may be obtained, are stated on pages, 7, 8.

3. Students entering the University and wishing to obtain surplus credit at entrance, or to complete the entrance requirements. It often happens that students have in June more or less than the requirements for admission to college. The Summer Session affords them the opportunity either to add to their surplus and thus, in some cases, to gain a year in time; or to make up their deficiency.

4. All persons qualified to pursue with profit any course given, whether or not they are engaged in study or teaching.

STATISTICS OF ATTENDANCE, 1910

The whole number enrolled in the Summer Session of 1910 was 987 (625 men and 362 women), representing 48 states and territories and 25 foreign countries. Of this number 387 were students during the previous winter; 377 were persons engaged in teaching, of whom, 26 were teachers in colleges, 15 in normal schools, 160 in high schools, 134 in grammar schools, 3 in private schools, and 39 were supervisors or superintendents.

ADMISSION—ATTENDANCE—REGISTRATION

There is no examination for admission to the Summer Session. Each person must, however, satisfy the instructor in charge of any course (unless it be elementary) that he is qualified to pursue the work. Any duly registered student of the Summer Session may visit such classes as he desires. **Admission to the class-rooms is restricted to duly registered students.** Persons wishing to have work done during the Summer Session counted towards an advance degree must conform to the regulation stated under the heading "Credit for Work", page 8.

All students are required to register at the office of the Registrar in Morrill Hall. They may register on Wednesday, July 5, between 9 a. m. and

5 p. m., or upon the day of their arrival, if they reach Ithaca later than July 5. Registration on July 5 is urged. Class exercises begin at 8 a. m. Thursday, July 6. The Registrar's office is open from 9 a. m. to 4 p. m. every day except Saturday when it is closed at noon.

TUITION FEE

The single tuition fee for the entire Summer Session, whether one course or more be taken, is $25. This must be paid at the office of the Treasurer, Room 1, Morrill Hall, within five days after registration day. In case of withdrawal, for reasons satisfactory to the Treasurer and the Registrar, within five days from the first registration day, the tuition paid may be refunded and the charge cancelled. In case of withdrawal within two weeks of the first registration day, one-half the tuition paid may be refunded. In case of registration after the first three weeks of the session, students must pay two-thirds of the full tuition fee. No student is admitted without the payment of this fee. Sibley College students taking shopwork are not exempted. Admission to classes is restricted to duly registered students.

LABORATORY FEES

Chemistry. A fee is charged for material actually consumed, and such deposit must be made with the Treasurer as the instructor may prescribe.

Physics, Botany, Physiology. In each of these departments the fee for each term or part thereof is at the rate of $1 for every five hours a week of work in the laboratory. The entire amount must be paid to the Treasurer at the beginning of the term.

Physical Geography and Geology. For course B in geography and also for course A in geology a fee of $1 must be paid in advance to the Treasurer to cover incidental expenses of the course.

Shopwork. The fee for shopwork is at the rate of $1.50 for every fifty hours spent in the shops. This must be paid in advance to the Treasurer. Students registered in Sibley College during the previous year are not required to pay this fee.

Zoology. See courses under Zoology, pages 40, 43.

Library Deposit. See under Library, page 9.

ACADEMIC CREDIT FOR WORK

In the College of Arts and Sciences. The requirements for the degree of Bachelor of Arts are residence for eight terms (four years), and the completion of one hundred twenty hours ("points") of elective work. A student who has satisfied the entrance requirements of the College, and has afterward completed in two or more summer sessions at least twelve hours of work in courses approved by the departments concerned, may be regarded as having thus satisfied one term of residence. Under no circumstances shall work done in summer session be accepted as the equivalent of more than one term of residence. The maximum amount of credit towards the A.B. degree which is allowed for the work of any one summer session is seven hours.

In other Colleges of the University. The nature and amount of credit allowed in these for summer session work may be learned from the statements under the announcement of each course.

In the Graduate School. Graduate work at Cornell is not expressed in terms of courses or hours. A graduate of any college whose requirements for a first degree are substantially equivalent to those for the first degree at Cornell may be admitted to resident study in the Graduate School. He may be admitted to candidacy for an advanced degree upon the recommendation of the professors under whom he proposes to work. The conferring of the degree itself does not depend primarily on the completion of any prescribed number of courses or of a fixed term of residence. It involves the writing of a thesis and the passing of a special final examination. The minimum period of residence for the master's degree is one academic year or its equivalent, and for the doctor's degree three years.

Not all work done by a graduate student is graduate work in the strict sense of the term. Graduate work to be considered as work for a degree must be of advanced character in some field or department of knowledge.

Graduate work toward an advanced degree may be done during the Summer Session under the following conditions: it must be done under the direction of a member of the Faculty of the Graduate School, after the student has entered the Graduate School and is admitted by the Dean of the School as a candidate for an advanced degree. The residence requirement for the master's degree may be satisfied by study during five Summer Sessions, or by study during one-half the academic year and in three Summer Sessions.

The graduate work offered in the summer of 1911 may be learned from the departmental announcement. Not all departments offer graduate work.

Any person wishing to become a candidate for an advanced degree and to study during the Summer Session should write to the professor whose work he expects to take, and also to the Dean of the Graduate School, asking for a blank form of application for admission to the Graduate School. It is much better to make these arrangements before coming to Ithaca, thus avoiding delay and interruption of study after the Summer Session has begun.

Certificates for Work Done. Students of the Summer Session who are not matriculated in the University may receive certificates of attendance and of work satisfactorily performed. Application for them must be made before August 16, and the applicant must leave at the office of the Registrar a large sized envelope stamped and directed to his home address. The certificate will then be forwarded by mail. The regulations of each department for the granting of a certificate must be met.

The Department of Education of New York City will, in certain subjects, accept these certificates instead of requiring examinations for licenses.

COST OF LIVING

The cost of board and furnished room in Ithaca during the Summer Session runs from $5.50 a week upwards. In some cases the cost has been reduced to $5, or even to $4.50, but it is not safe to count upon less than $5.

The price of a single furnished room may be as low as $1 a week. The prices advance with the size and location of the rooms.

The price of table board runs from $4 and $4.50 in boarding houses, to $7 and $10 at the hotels. Living at hotels costs from $10.50 up.

The University has one residence hall, the Sage College, with an annex, Sage Cottage. This will as heretofore be opened for women throughout the Summer Session. Married men accompanied by their wives may be lodged in Sage Cottage, where the first and second floors will be reserved for them. As the great majority of the persons living in these buildings are attending the University for serious work, it is necessary that the rooms and halls should be quiet during the hours of rest. Persons unwilling to conform to reasonable regulations for securing this quiet are not wanted in the buildings. The price of rooms in Sage College is from $1.25 to $5.50 a week, according to location, and of table board $5.00 The capacity of the building is usually engaged in advance, and early application is therefore advisable.

This should be made to the Manager of Sage College, Ithaca, N. Y. Every application for a room to be reserved must be accompanied by a deposit of $5, otherwise the application is not registered. The amount of this deposit is deducted from the rent if the room assigned be occupied by the applicant; it is refunded if the applicant gives formal notice to the manager on or before June 15th that she desires to withdraw the application altogether.

Without permission from the Director of the Summer Session no one will be allowed to room in Sage College or Sage Cottage during the summer unless registered in the Summer Session.

The whole expense of attendance at the Summer Session, not including laboratory fees, may be estimated at $75 to $85.

THE LIBRARIES

The University Library is open on week days from 9 a. m. to 5 p. m., except Saturday, when it closes at 1 p. m. In this are housed the main library, containing about three hundred and ninety thousand volumes, and most of the seminary and special libraries. The main reading room affords accommodations for over two hundred readers, and contains a selected library of over 8,000 volumes of reference works. Adjacent to it is the periodical room in which are kept the current numbers of about five hundred journals in various fields of knowledge. These rooms are open to all students. Students properly qualified are allowed the use of the seminary rooms and of the books in them. The main collection is primarily a library of reference for use in the building. Students are, however, allowed to a limited extent to take out books for home use. Persons wishing this privilege must make a deposit of $5, which will be refunded upon the return of all books taken out. Special libraries of chemistry, in Morse Hall, and of anatomy and physiology, in Stimson Hall, are open to students in these departments.

LECTURES, MUSICAL RECITALS, EXCURSIONS

In addition to the regular class room work there will be lectures on topics of general interest on Monday evenings throughout the session. In addition to these there are lectures on topics of general interest each week in connection with the various departments. Notice of these will be given in the calendar for each week during the Session.

Musical recitals will be given on Tuesday and Thursday evenings in the Sage Chapel.

Wednesday evenings are devoted to the departmental conferences which are open to all interested. Notice of these will be given from week to week. In connection with the work of several departments excursions are made to many points of interest. Most of these are open to members of the Summer Session. Notice of them is given from week to week. Dr. E. J. Bailey, of the Department of English, will conduct a series of walks through the most interesting glens and over the most beautiful country roads in the vicinity of Ithaca. Long and somewhat difficult excursions will be undertaken on Friday afternoons; others, shorter, will be arranged for Wednesday evenings and Sunday afternoons.

RAILROAD ROUTES AND RATES

Ithaca is reached by either the Lehigh Valley or the Lackawanna railroad. By the latter, a branch leaves the main line at Owego. Through trains run from New York and Buffalo on the Lehigh, and through sleeping cars run daily from New York on both roads. From Philadelphia, Baltimore, Washington, and the South, via the Baltimore & Ohio, the Philadelphia & Reading connects with the Lehigh at Bethlehem. On the Lehigh, through trains for Ithaca connect with the New York Central at Auburn and Canastota, and with the Pennsylvania (Northern Central) and the Erie at Elmira.

From points in Trunk Line and New England Passenger Association territory (east of Pittsburgh and Buffalo and north of Washington, D. C.), a special railroad rate of a fare and three-fifths will be granted to students of the Summer Session. This reduction can be obtained only by application for the proper certificate (not receipt), when buying a ticket to Ithaca, and upon condition that at least one hundred certificates are presented to the Registrar at Ithaca. The University can not guarantee the reduction to anyone. In previous years, however, the condition always has been met, and the reduced fare obtained by holders of certificates.

To secure the reduced rate for your return journey, you must buy a regular ticket from your starting point to Ithaca, not earlier than July 2nd nor later than July 8th. When purchasing your ticket, ask for a certificate, not a receipt. If you start from a point outside the territory within which the reduced rate is granted, you can buy a ticket to some point in this territory and then buy a ticket to Ithaca, getting the proper certificate. It is best to find out about this matter a week or so before the time when you intend to start.

If the full number of certificates is presented to the Registrar at Ithaca, you will then be entitled, upon payment of twenty-five cents, to receive an order entitling you to a return ticket to the point of starting, for three-fifths of the fare paid in coming to Ithaca. This privilege begins August 13th and expires August 19th. You should present your certificate when you register at the University.

For further information, and for directions as to form of application, apply to the Registrar, Cornell University, or to railroad agent at home office.

COURSES OF INSTRUCTION

Most of the courses offered consist of five exercises a week, each week day except Saturday. The number of actual hours of class work in any course may be found by multiplying the weekly exercises by six.

The word "hour" used in speaking of University credit means the equivalent of one class exercise a week for a half year. One hundred and twenty such "hours" are required of candidates for the A.B. degree.

(G. S. = Goldwin Smith Hall).

EDUCATION

Courses A, B, and C will be found especially helpful to college graduates who are preparing for examination in professional subjects as outlined in the New York State Syllabus and Course of Study for the renewal of the College Graduate Certificate Limited. The State Education Department will hold an official examination for such candidates at Ithaca, August 15 and 16. Since it is permissible to do so, those who can should prepare for examination in two subjects this summer and for the remaining two a year later.

A. **Principles of Education.** Lectures, discussion, and text-book study. Professor DEGARMO. Except Sat., 11. *G. S. 256.* Credit, two hours.

This course is designed to be an introduction to the general theory of education, and falls into three distinct parts, one pertaining especially to the school studies, the second to the scientific method of teaching them, and the third to the ethical training of adolescents. The following are some of the leading topics. The social and the individual basis of education; the basis for the selection of studies; their classification; their function and relative educational worth; the mental discipline that each should furnish; the organization of the studies into curricula; the correlation of high-school studies; scientific basis for high-school methods; function of authority; observation and experiment, of hypothesis and analogy in getting and explaining facts; nature and function of the 'problem'; nature and place of induction and deduction in teaching; the means for securing efficiency; function of the laboratory and work-shop; heuristic methods; German methods; essentials of ethical training. Text-books: DeGarmo's Principles of Secondary Education, vols. I, II, and III; collateral reading: Principles of Education by Henderson, by Bolton, and by Roediger, respectively. Also, for elementary teachers, Bagley's Educative Process. Reference books: the McMurry Series for elementary teachers, and for secondary teachers, the Macmillan and the Longmans Series on the teaching of the respective subjects. As far as issued these are as follows.

1. The Macmillan Series: 1. English. Percival Chubb. 2. Mathematics. David Eugene Smith.

2. The Longmans Series: 1. English. Carpenter, Baker, and Scott. 2. Latin and Greek. Bennett and Bristol. 3. Mathematics. J. W. A. Young. 4. Physics and Chemistry. Smith and Hall. 5. History and Civics. Henry E. Bourne. 6. Biology. Lloyd and Bigelow.

B. **History of Education.** Lectures, discussions, text-book, and prescribed readings. Professor DEGARMO. Except Sat., 9. *G. S. 256.* Credit, two hours.

This is a course in historical interpretation. It is based upon the development of thought and institutions, and the significance of each aspect is estimated from its bearings upon the educational problems of the present. Special emphasis is placed upon the following topics: the education of the Greek people; the rise and development of humanism; the rise and development of science and scientific methods in education; the doctrine of educational reformers; the development of modern systems of education, including industrial training. Text-book: Monroe's Text-book in the History of Education.

C. **Educational Psychology.** Lectures, discussions, and readings. Professor KIRKPATRICK. Except Sat., 8. *G. S. 256.* Credit, two hours.

The course presents a system of functional psychology as applied to education, with particular reference to such topics as nervous plasticity, habit, attention and interest, instinctive response, the nature of educational training and discipline, association, perception, observation, memory, imagination, conception, judgment, and reasoning, and with reference to special school room activities such as reading, drawing, studying, and work in geography. Where feasible, psychological experiments that apply to the work in hand are described or performed. Students will find it convenient to have Whipple's Questions in General and Educational Psychology (Cornell Study Bulletins for Teachers, No. 3), and will find it advisable for outside reading to purchase James' Talks to Teachers on Psychology, and Kirkpatrick's Fundamentals of Child-Study. Students who have had no previous work in psychology are advised to take also Psychology, Course A.

D. **Genetic Psychology applied to Education.** Lectures, discussions, and readings. Professor KIRKPATRICK. Except Sat., 10. *G. S. 234.* Credit, two hours.

It is desirable that those who take this course shall have studied psychology, and shall have done some work in genetic psychology such as is represented in Kirkpatrick's Fundamentals of Child-Study and Genetic Psychology; with outside reading during the summer, those who have not had this preparation will still be able to take the course. The general principles governing the development of human beings as individuals and the part that interest plays in this development will be considered, after which the stages of development will be outlined and each period discussed in detail. The courses of study and the methods used in the different grades will then be considered in relation to the different periods of development. Economy and conservation of mental energy will also be discussed. The course will be especially suited to principals and superintendents, but an intelligent and progressive teacher of any grade may get from the course a broader view of education and some specific suggestion regarding the age and grade with which he has to deal.

E. **School Organization, Administration, Supervision, and Management.** Credit, two hours. Except Sat., 10. *G. S. 256.* Superintendent POLAND.

This course is intended primarily for superintendents, principals, vice-principals, supervisors, head assistants, critic teachers, executive officers, and in general for teachers holding or preparing for supervisory and executive positions.

The principal subjects discussed will include the following:

Education as an appropriate function of national and of state government; the school compared with other social institutions as to its aims, methods, and results; county, township, and municipal systems compared; the district school; study of several typical forms of municipal school organization; powers and duties of boards of education and of their various officers and employees.

Organization of a teaching corps; mutual relations of its various members, systems and methods of school supervision including functions of superintendent, supervisor, principal, head of department, critic teacher, etc.; training for supervision, its requirements, opportunities, etc.; training, licensing, appointing, and dismissal of teachers; ways and means for improving teachers during term of service; salaries and tenure of office of superintendents, principals, and teachers; pensions and annuities of teachers.

Courses of study in elementary schools, including discussion of problems concerning organization, standardization, utility, waste, etc.; selection and use of text books and of school supplies; class room management from the point of view of teacher, principal, supervisor, superintendent, and teacher of special branches; classification, gradation, and promotion of pupils; organization of weekly and daily programs including discussion of time allotment for occupation, study, recitation, and recreation periods; group and departmental teaching; supervised and unsupervised study including problems of home study; common defects in class teaching and class management; discussion of mass instruction vs individual instruction; tests and examinations as teaching processes; their value and limitations for the purpose of determining promotions; pupils' records and home reports.

Recesses, play, gymnastics, and school athletics; provisions for exceptional children, as mentally defective children, cripples, etc.; problems of school discipline; parental or disciplinary schools, reform schools, etc.; plans for pupil self-government; rewards and punishments; plans for securing home cooperation, as parents' meetings, etc.; utilization of other outside agencies in securing cooperation and support.

Moral and religious training in the school; relations of the public school to private and parochial schools, especially as to interchange of pupils.

Compulsory education laws and means required to enforce them.

Problem of securing competent substitute teachers; penalizing teachers for absence and for tardiness; general problem of over-tension in the school system with discussion of means for its relief.

Vacation schools, evening schools, and industrial (continuation) schools; discussion of their needs, organization, teaching corps, etc.

Cost of education, including discussion of economies that may be introduced; question of equal pay for men and women teachers.

Teachers' organizations for culture, mutual aid, and for professional advancement.

The school as a social centre including a discussion of problems for increasing its power and influence in moulding citizenship.

Purpose and value of school statistics and how to study them profitably.

School grounds, buildings, and equipment, including a discussion of problems of lighting, heating, ventilation, and sanitation.

No text books will be used, but students will find it profitable to have such books as Dutton and Snedden's Administration of Public Education in the United States; Chancellor's Our Schools, Their Administration and Supervision, and City Schools, Their Direction and Management, Perry's The Management of a City School; Horne's The Philosophy of Education; Bagley's The Educative Process and Class Management; DeGarmo's Interest and Education.

A full bibliography of the most useful books for reference and study will be furnished to students upon application.

F. **Industrial Education.** Lectures and conferences treating the correlation of practical work with the study of methods and principles in this field. Except Sat., 12. *G. S. 142.*

For full description of course, and for details of the many other courses in this department, see pages 46 to 51.

G. **Physical Education, Folk and National Dances, School Games.** Except Sat., 4.00–5.30. Sage College Gymnasium. Miss SAMETH.

The work of this department is arranged to give a practical knowledge of some of the games and folk and national dances suitable for use in both elementary and high schools as well as in playgrounds.

Materials will be selected largely from the lists of games and dances approved by the New York Public Schools' Athletic League and those suggested by the syllabus now in use in the New York City public schools.

Gymnasium costume or dancing skirt with soft slippers (without heels) will be advisable.

Games 4.00–4.40; dancing 4.50–5.30.

H. **The Teaching of English.** See courses under English, page 15.

I. **The Teaching of Latin.** See courses on page 20.

L. **Training Courses for Teachers of History.** See courses on page 21, and also under Civil Government, page 22.

M. **Teachers' Course in Mathematics.** See course G and H, pages 25, 26.

N. **Physics for Teachers.** See courses 7 and 10, pages 27, 28.

O. **The Teaching of Music.** See pages 23–25.

P. **The Teaching of Geography and Geology.** Nearly all courses are pedagogical. Pages 32 to 36.

Q. **The Teaching of Biology.** See under Botany, Entomology, Zoology, and Physiology.

R. **Nature Study.** See page 39.

S. **Drawing for Teachers.** See pages 50, 51.

In addition to these courses there are many others not specially enumerated here in which a large portion of the time is devoted to the pedagogical aspects of the subject. In fact, all the work of the session is arranged primarily to meet the various problems of teachers, and even in the elementary courses the best form of presentation of subject matter receives attention and illustration.

PSYCHOLOGY

A. **Introduction to Psychology.** *G. S. Room C.* Exc. Sat., 9. Text-book: Titchener's Primer of Psychology. Assistant Professor BENTLEY. This course is intended to serve as a general introduction to the study of psychology from the experimental point of view. The first part treats of sensation, affection, and attention; the second part, of perception and idea, association, emotion, and the simpler forms of action; the third part, of memory and imagination, thought and self-consciousness, sentiment, and the complex forms of action. Wherever it is possible, the lectures are illustrated by experimental demonstration. The concluding lectures deal with the psychology of the abnormal, and with the province and relations of psychology as a whole.

If only the lectures and examinations are taken, credit will be two hours; if the prescribed exercises are done, three hours.

B. **The Psychology of Common Life.** *G. S. C.* T Th., 11. Assistant Professor BENTLEY. The lectures discuss the psychological facts and laws underlying work and fatigue, linguistic lapses and slips of memory, truth-telling and falsehood, dreams and suggestion, mental prophylaxy and the use of psychotherapeutical agencies, illusions and delusions, belief in the occult, and other like experiences of everyday life. Credit, one hour.

C. **General Psychology: Laboratory Practice.** Psychological Laboratory, *Morrill Hall.* M W F., 2.30–5.00, or 10–12.30 by special arrangement. The course will include prescribed work on literature and record books. Text-book: Titchener's Experimental Psychology, Qualitative. Dr. GEISSLER, and Mr. BORING. In this course the student repeats for himself, under experimental conditions, certain of the classical observations of human psychology. A wide range of selection is offered as regards individual experiments. Credit, two hours.

D. **Laboratory Methods in Applied Psychology.** Psychological Laboratory, *Morrill Hall.* M W F., 10–12. Dr. GEISSLER, and Mr. BORING. This course attempts by means of discussions, demonstrations, and class exercises, to illustrate the use of psychological methods in education, law, and medicine. Open to students familiar with general psychology. It may also be taken in connection with course A. Credit, one hour.

E. **Comparative Psychology: Laboratory Practice.** *Morrill Hall.* Hours and credit to be arranged. Assistant Professor BENTLEY and Dr. GEISSLER.

Observation under experimental conditions of vertebrate and invertebrate animals. Reading and laboratory records.

F. **Advanced Work.** *Morrill Hall.* Hours and credit to be arranged. Assistant Professor BENTLEY and Dr. GEISSLER. Essays and laboratory studies.

ENGLISH

A. **Composition.** Except Sat., 8, *G. S. 164.* Credit, two hours. Dr. MONROE.

A practical drill, intended for those who lack proficiency in writing: frequent short themes and several longer papers, chiefly expository; discussion of the elements and forms of discourse; weekly personal conferences at hours to be appointed.

B. **The History of the English Language.** Except Sat., 10, *G. S. 163.* Credit, two hours. Dr. MONROE.

A study of the development of the language to the present day, its vocabulary, sounds, inflections, and constructions, foreign influence, and allied topics. Special attention is given to the practical bearing which the historical study of the language has upon its present form, written and spoken. Recitations and lectures based upon Krapp's Modern English as a syllabus; collateral reading.

C. **Wordsworth and Coleridge.** Except Sat., 9. *G. S. 156.* Credit, two hours. Dr. Cox.

An introduction to the study of nineteenth century poetry. Recitations and discussions on the more important works of Wordsworth and Coleridge.

D. **Literary Principles.** Exc. Sat., 11. *G. S. 160.* Credit, two hours. Dr. Cox.

An advanced course dealing with the rhetoric of Aristotle, with a view to determining how largely its principles underlie the substance and style of modern prose.

E. **Browning and Tennyson.** Except Sat., 12. *G. S. 156.* Credit, two hours. Dr. BAILEY.

A comparative study of the poems of Browning and Tennyson, intended to lead the student toward an intelligent appreciation of poetry as an art, by showing him the ways in which poetry may be studied.

F. **Teachers' Course.** Exc. Sat., 8. *G. S. 156.* Credit, two hours. Dr. BAILEY.

Designed for those who are teaching English, or who expect to teach the subject. Methods of treating the books required by the College Entrance Board; discussion of related topics in composition and in grammar. This course, which is open to advanced students, is not intended as a preparation for college entrance examinations.

G. **Shakespeare.** Except Sat., 10. *G. S. 162.* Credit, two hours. Assistant Professor ADAMS.

A study of Shakespeare's tragedies. Hamlet, Othello, King Lear, and Macbeth will be read and discussed in class-room; other plays will be assigned for home reading. A. C. Bradley's Shakespearean Tragedy will be used as a text book.

H. **English Literature 1557–1660.** Except Sat., 12. *G. S. 162.* Credit, two hours. Assistant Professor ADAMS.

An advanced course, designed for those who desire to read extensively in the literature of the period. The emphasis will be upon the non-dramatic literature.

I. **Nineteenth Century Prose.** Except Sat., 11. *G. S. 156.* Credit, two hours. Associate Professor MORTON.

A study of characteristic examples of the work of some of the more important English prose writers of the past half-century,—among them Arnold, Newman, and Pater. Discussion of the elements of prose style.

J. **English Verse.** Except Sat., 9. *G. S. 160.* Credit, two hours. Associate Professor MORTON.

An advanced course, dealing with the principles and development of English verse, particularly non-dramatic blank verse. Designed for students of poetry, and for English teachers whose work involves elementary instruction in metrical forms.

Graduate work. Graduate students who wish to spend their entire time in English work during the session are requested to correspond with Professor Adams (Goldwin Smith, 169) before June 10th.

SPEAKING AND READING

In all the courses described below, individual instruction will be given by appointment. In this way the particular needs of each student, however varied they may be, can be met. No fees will be charged for this special instruction.

A. **Voice Training.** Except Sat., 9.30 (half-hour periods). *G. S. 21.* Credit, one hour. Mr. BLANTON.

This course consists of exercises, both physical and mental, for the development of pure tone, flexibility and strength of voice, clear enunciation, and for relief from high, strained tones, harshness, throatiness, and speakers' sorethroat. The closely related subject of ease of action will also receive attention. The training is as valuable for the use of the voice in conversation as in public speaking and reading.

B. **Public Speaking.** Except Sat., 10. *G. S. 21.* Credit, two hours. Assistant Professor WINANS.

A practical training for speaking in public. Original speeches and selections ; extemporaneous speeches. Methods of preparing will be discussed and illustrated. High school teachers will find the methods applicable to their work. Regular students passing this course will be admitted to the work of the second term in Public Speaking, Course 1b.

C. **Oral Reading.** M W F., 11. *G. S. 21.* Credit, one hour. Mr. BLANTON.

This course is designed especially to help teachers of literature, but is open to all students. The first part of the course will be devoted to the elements of reading—attention, and individualization and sequence of ideas. The second part will be given to the oral interpretation of great pieces of literature. Each member of the class will prepare individually at least one selection.

FRENCH

A. **Elementary French Grammar and Reading.** Fraser and Squair's Abridged French Grammar will be used. The object of the course is to teach the essentials of French pronunciation and grammar. Very thorough drill will be given in both of these subjects. Daily except Sat. 8 and 12. *G S. 283.* Professor OLMSTED. University credit, four hours. Entrance credit, one unit.

B. **Grammar Review and Reading.** Fraser and Squair's Abridged French Grammar; Comfort's French Composition; Buffum's French Short Stories, etc.

Intended for those who have had one unit of preparatory school French, or its equivalent. There will be a rapid review of syntax and of the irregular verbs, and three hundred or four hundred pages of French texts will be read. Daily, except Saturday, 8 and 12, *G. S. 281.* Assistant Professor GUERLAC. University credit, four hours. Entrance credit, one unit.

C. **Advanced Entrance French.** Anatole France's Le Livre de mon Ami (Guerlac), Daudet's Short Stories (Cameron), Dumas' La Question d'Argent

(Henning), Le Sage's Gil Blas (Sanderson), François' Advanced Prose Composition. Intended for those who have had two units of preparatory school French, or one year of college French, and will enable such persons to make up the advanced entrance requirement. Students taking this course are expected to devote their entire time to the subject. Daily 8a nd 12. *G. S. 277.* Mr. MASON. University credit, five hours. Entrance credit one unit.

D. **Lectures in French.** Tableau de l'Histoire de la Littérature Française. Intended only for those who have had some practice in understanding spoken French. T Th., 10, *G. S. 281.* Assistant Professor GUERLAC. Credit, one hour.

SPANISH

A. **Grammar and Reading** for beginners. The object of this course is to afford to those who have had no Spanish an opportunity to acquire the essentials of the grammar, to learn to translate easy Spanish readily, and to read Spanish as Spanish understandingly. Spanish will be spoken, as far as feasible, in the class-room. To accomplish this in six weeks requires determined application. Students are advised not to attempt it unless they have had previous language training. Two recitations aday will be held, and the student is expected to devote his entire time to this subject. Olmsted and Gordon's Spanish Grammar will be used. Daily 8 and 12. *G. S. 290.* Assistant Professor GORDON. University credit, five hours. Entrance credit, one unit.

GERMAN

A. **Elementary German.** Grammar, translation, conversation, and composition. Text-books: Vos's Essentials of German and Hewett's German Reader. This course affords an opportunity for those who have had no German to master the essentials of grammar, to acquire facility in the translation of easy German and to begin conversational work in the language. The instructor will be in Room 182, T and Th. at 9 to give special assistance to members of this class. Two recitations will be held daily except Saturday with sufficient time between the two for the preparation of the second lesson. After successfully completing this course, students can, by supplementary reading during the summer, prepare themselves for the fall entrance examination in Second-Year German, or they may take the Second-Year German course during the regular college year. Daily except Sat. 8 and 12. *G. S. 183.* Assistant Professor POPE. University credit, four hours. Entrance credit, one unit.

B. **Second Year Course in Elementary German.** Rapid review of the essentials of grammar and more extensive work in translation, composition, and conversation. Two recitations will be held daily except Saturday with sufficient time between the two for the preparation of the second lesson. Text books: Vos's Essentials of German and Hewett's German Reader. Prerequisite: one year of high school German or its equivalent. Those who do not present certificates showing the completion of one year's work in German will be required to take a test at the beginning of the course. This course is equivalent to the second year of high school German and its completion entitles the student to a second unit of entrance credit in German.

University credit, four hours. Daily except Sat., 8 and 12. *G. S. 177.* Mr. ZINNECKER. The instructor will be in Room 178, T Th at 9, to afford special assistance to members of this course.

C. **Rapid Reading, with Comment, of the Advanced Requirements for Admission in German.** Freytag's Journalisten, Schiller's Wilhelm Tell, Goethe's Hermann und Dorothea. The purpose of this course is to enable students who are deficient in the advanced requirements for admission to make up by extra work the entire amount required. Two recitations a day will be held, with a sufficient interval to enable the student to prepare for the second recitation. Students electing this course are expected to devote their entire time to this subject. Daily, 8 and 12, *G. S. 190.* Dr. LIEDER. University credit, five hours. Entrance credit, one unit.

Dr. LIEDER will be in attendance in Room 178, T Th., at 9, to afford special assistance to such students as desire it.

D. **Advanced Course in Modern German Grammar.** Except Sat., 11. *G. S.* 137. Assistant Professor BOESCHE. Credit, two hours.

The aim of this course is entirely practical. It is particularly intended to serve the needs of teachers of German who feel that without a thorough and fairly scientific knowledge of grammar there can be no competent teaching of its elements. The most troublesome and important questions in modern German accidence and syntax will be discussed with far greater thoroughness than is found in even the larger works on the subject. The inflection of pronouns and adjectives, the use of the cases, the employment of haben and sein as auxiliaries, the subjunctive, moods and tenses in indirect discourse, and the order of words will be among the topics treated. The outside work will include exercises specially designed for this course, assigned readings in works of reference, and the preparation of oral and written reports.

E. **Advanced Composition and Conversation.** Except Sat., 10. *G. S. 190.* Assistant Professor DAVIDSEN. Credit, two hours. This course will aim to train the students to write and to speak correct German. It will be conducted as far as possible in German. No text-book will be used, but papers, based upon pictures and works of literature discussed orally in class, will be handed in regularly and corrected by the teacher. Certain hours will be set aside for instruction in elementary phonetics, if the class so desires.

F. **Studies in the Style and Technique of the Nineteenth Century Prose Writers.** Except Sat., 9. *G. S.* 183. Assistant Professor DAVIDSEN. Credit, three hours. This course has a double aim. It will train the student to readily understand spoken German, and by the discussion of the peculiarities in style and technique of modern prose writers, it will cultivate in him an appreciation for the stylistic differences in modern German prose.

The time will be about equally divided between lectures in German and class room discussions. Extensive reading will be required, mostly of ordinary difficulty and largely of works that are or ought to be read in schools and colleges.

G. **Historical German Readings and Lectures.** Except Sat. 8. *G. S. 137.* Assistant Professor BOESCHE. Credit, two hours. This course combines the rapid reading and discussion of historical German texts as literature with

such a study of important periods of German history and civilization as will give a better insight into the development of modern Germany. The lectures will in large part be in German. The course presupposes a fair reading knowledge of German.

LATIN

The Summer Session work in Latin is intended primarily for teachers in secondary schools. The courses offered aim to secure this end in two ways: first, certain courses (A, C, D) are planned with the purpose of giving intensive consideration to the fundamental problems involved in the daily work of the secondary teacher; second, by means of an advanced reading course (B), the attempt is made to increase the range of the teacher's familiarity with the literature and to open up new topics of interest connected with Roman life and thought.

A. **The Teaching of Latin in Secondary Schools.** Except Sat. at 9, *G. S. 134.* Professor CHARLES EDWIN BENNETT. Credit, two hours. This course will give consideration to the main topics of vital importance to the teacher in his daily work. Thus, attention will be given to pronunciation, to the reading of Latin verse, to the syntax of the Latin cases and moods, particularly of the subjunctive, to the method of teaching Latin composition, to the best method of acquiring a vocabulary, to reading at sight, to the range of reading desirable for secondary pupils, to collateral study suitable for the school. Sample recitations in beginning Latin, Caesar, Cicero, and Virgil will also be conducted by the professor in charge of the course. Those intending to take course A should bring texts of Caesar, Cicero, and Virgil.

B. **Reading Course in Latin Poetry.** Except Sat. at 10, *G. S. 134.* Professor CHARLES EDWIN BENNETT. In this course the class will read selections representing the best of Latin poetry from Lucretius and Catullus down to the later empire. The book used for this purpose can be purchased in Ithaca. Work will also be assigned in the study of the literary history and significance of the authors from whose works the selections are chosen. Each member of the class should bring Mackail, History of Latin Literature, or Duff, A Literary History of Rome. Credit, two hours.

C. **Latin Composition.** Except Sat. 11, *G. S. 134.* Mr. CHARLES ERNEST BENNETT. This course is designed to meet the needs of those who may desire somewhat advanced training in connected Latin writing. The work will include the re-translation of English renderings of selections from certain classical authors not usually read, with especial attention to the more difficult and unusual idioms of both languages. Opportunity will also be given for the original composition of brief papers on subjects suggested by the instructor. Credit, two hours.

D. **Virgil's Aeneid.** Except Sat. 12, *G. S. 134.* Mr. CHARLES ERNEST BENNETT. Books I and II with selections from Books III–VI. The aim of this course is to give, as far as possible by rapid reading, a literary appreciation of the Aeneid as the great Roman epic. In this connection lectures will be given from time to time on various topics suggested by the subject-matter. Attention will also be paid to the more striking grammatical and stylistic difficulties presented by the text. Credit, two hours.

HISTORY

A. **Ancient History from Alexander the Great to Augustus.** Except Sat. 9, *G. S. 234.* Credit, two hours. Professor SILL.

A survey of the history of the Mediterranean world from the accession of Alexander the Great to the death of Augustus. The period includes the conquest of Asia by Alexander, the establishment of Macedonian monarchies in the East and the fusion of Greek with Oriental civilization, the unification of Italy under Rome, the establishment of Roman supremacy throughout the Mediterranean world, the transformation of Roman life and thought under the influence of Hellenism, the Roman revolution, and the reorganization of the commonwealth under Augustus. The course is intended for teachers and especial attention will be given to sources and to other literature available for their use.

B. **The Dawn of Modern History.** Except Sat. 12, *G. S. 245.* Credit, two hours. Professor BURR. The life and thought of Christendom from the Crusades to the Reformation. The lectures will deal with the results of the Crusades; the rise of the towns; the growth of the new nations; the revival of literature, of art, of science, of conscience; the age of discovery; the spread of humanism; the collision of heresy with authority. While not ignoring the political story of these centuries, attention will be given chiefly to their social and intellectual history.

C. **European History, English and Continental, since 1815.** Except Sat. 11, *G. S. 242.* Credit, two hours. Professor SILL.

This course will deal with Europe as a whole but will have particular reference to England, to the relations between England and other European powers, and to the expansion of the British Empire. The period between 1815 and 1848 will be treated as introductory to the history of the past sixty years, in which, in addition to questions of international politics and of national reorganization, consideration will be given to economic changes, to social legislation, and to the general movement of thought in England and on the Continent. The course may be regarded as an historical introduction to the study of contemporary European politics.

D. **American Political History.** The Slavery Controversy, the Civil War, and Reconstruction. 1820–1869. Except Sat. 10. *G. S. 234.* Credit, two hours. Professor WOODBURN.

The course is designed to present a study of the causes and results of the Civil War in America. The military aspects of the war will be considered only incidentally and emphasis will be laid on the constitutional and political aspects of the struggle. The sectional struggle over slavery will be reviewed by the consideration of such topics as the Missouri Struggle, the Abolition Agitation, the Texan Movement, the Compromises of 1850, the Fugitive Slave Law and the Struggle for Slavery Restriction in the decade prior to the secession movement. The course will close with a study of the problems of reconstruction, 1865–1869.

E. **Historical Method and the Teaching of History.** Except Sat., 4 or some hour which better suits the convenience of the class. *European History Seminary Room, Library.* Credit two hours. Professor BURR.

A course preparatory to the teaching of history and to historical research. It will discuss what history is, what it is for, what are its materials and its methods, what its relations to allied studies, how to read history, how to study it, how to teach it, how to write it. The class will be cooperative, and will be open only to those who are ripe for its work and willing to take an active part in it.

F. **Paleography and Diplomatics.** Professor BURR will be glad to give instruction, should any desire it, in the reading of historical manuscripts and the interpretation of historical documents. Place and hours to be arranged to meet the convenience of the class.

CIVIL GOVERNMENT

A. **American Government and Politics.** Except Sat. 8. *G. S. 234.* Credit, two hours. Professor WOODBURN.

The course will be divided into two parts. 1. A study of the state and national governments and their relations to each other, with emphasis upon the executive, legislative, and judicial departments of the government of the United States, including not only the theoretical but also the practical operation of the government and the unwritten aspects of the American constitution. 2. A study of the American party system, or government by party, including a brief sketch of parties, the rise of the convention system, the growth of party organization, with some consideration of present day party machinery and party problems.

ECONOMICS AND SOCIAL SCIENCE

A. **Principles of Economics.** Except Sat., 11. *G. S. 264.* Credit, two hours. Professor KEMMERER.

In this course a survey will be made of the more fundamental principles of economic science. These will be studied with particular reference to their application to current economic and social problems in the United States. The aim of the course is not only to give principles and facts, but also to train the student in the exercise of an unbiased judgment on present day economic problems.

B. **Social Institutions.** Except Sat., 9. *G. S. 256.* Credit, two hours. Assistant Professor BAUER.

This course will cover the principles of social evolution, aiming to show and amply illustrate how the various physical, psychological, social, and particularly economic forces work together in shaping human institutions. A special study will be made of domestic and religious institutions, with the object of explaining the rapid changes that are taking place. Lectures, assigned readings, and discussions.

C. **Corporations, and the Trust Problem.** Except Sat., 8. *G. S. 256.* Credit, two hours. Assistant Professor BAUER.

This course will take up the following subjects: (1) the corporation,—its nature, organization, financial operations, and legal standing; (2) causes that have led to the formation of large corporations and trusts; (3) social benefits and evils due to trusts; (4) trust legislation. Lectures, assigned readings, and discussions.

D. **Money and Banking.** Except Sat., 10. *G. S. 264.* Credit, two hours. Open only to students who have had or are taking course A. Professor KEMMERER.

This course will consider the general principles of money and banking, their exemplification in American history, and their application to certain problems at present agitating the public mind, such as the increased cost of living, and the reform of our national banking system.

MUSIC

A special announcement of the Department of Music is published giving full details of all the Summer Session courses in the subject. This will be sent post-free on application to the Director of the Summer Session.

Staff of Instruction: HOLLIS ELLSWORTH DANN, Professor of Music, Cornell University; THOMAS TAPPER, Lecturer, Institute of Musical Art, New York; LAURA K. BRYANT, Supervisor of Music, Ithaca Public Schools; ARTHUR J. ABBOTT, Supervisor of Music, Manchester, N. H.; JOHN JEROME HAYES, Teacher of Singing, New York; NEWTON SWIFT, Teacher of Piano and Theory, Boston; EDWARD FRANCIS JOHNSTON, Organist, Cornell University.

The courses in music in the Summer Session are primarily intended for the training of supervisors and special teachers of music in the public schools. The time required for the completion of the outlined course depends on the ability and capacity of the student and upon the amount and quality of training which he has had previous to entrance.

Students who are proficient in sight reading, ear training, piano playing, and singing, may pass the entrance examinations for the second year courses and thus complete the course in two summer sessions. Others will find it necessary to do considerable home study during the academic years between the three summer sessions.

Special attention is given to the subject of music in the normal school. An additional class, exclusively for teachers of music in the normal schools, will take up the problems of normal school music teaching in detail.

The probability is that the future will witness a requirement made by all school boards and state boards of education, demanding that the grade teacher as well as the supervisor shall qualify in music as she must quality in every other subject in the elementary curriculum. Such a requirement is already in force in several states. This makes a special course of music for grade teachers an actual necessity. The courses in the Summer Session are directly adapted to the training of grade teachers. Cornell is thus the first university to place at the grade teachers' disposal a practical opportunity for thorough preparation in the subject of public school music. A teacher who satisfactorily completes a prescribed course, will have received thorough training in sight reading, in melody writing, in ear training and dictation, and in the methods of presenting public school music. Changed conditions and the important place music has assumed in public education make training to this extent, a requisite. It gives the teacher as much freedom in her knowledge of methods and materials in music as she possesses in the subjects of geography, spelling, arithmetic, and the like.

First year courses are designated A; second year courses, B; third year courses, C.

Sight Reading—A. An elementary course. All that is required for entrance is sufficient aptitude and ability to pursue the subject with profit.

Sight Reading—B. Before entering the third year class, students are required to read at sight music including the more difficult intervals and chromatic tones, and including, also, the rhythmic problems common to music taught in the eight grades of the public schools.

Ear Training—A. The only requirement for entrance is a general vocal capacity for the study of music and the ability to match tones.

Dictation—B. This course includes the work in dictation of the first five years in music. The topics for consideration are oral and written tonal dictation and oral and written metric dictation.

Dictation—C. An advanced course. Topics for study are chromatics, simple modulations, advanced studies in rhythm, and the longer metric groups.

Material—B. Course B is devoted to the material for the kindergarten, and for the grades from the first to the fifth year inclusive.

Material—C. Course C is devoted to the material for the sixth, seventh, and eighth grammar grades, and to material for the high school.

Methods—B. This course is devoted to the pedagogical consideration of music from the kindergarten to the fifth year inclusive.

Methods—C. Methods C is open only to students who have completed Methods B, and is concerned with the pedagogical consideration of music in the grammar and high schools. The course will deal with the details of teaching in the upper grades and in the high school.

Practice Teaching. Practical use of the material for all grades, and application of methods of teaching, will be required. Each student will be given frequent opportunity for practice teaching under supervision of different members of the faculty. Classes of children will be in attendance.

Constructive Music—A. Course A provides instruction in the elements of music. There are taken up for study in this course, notation, the scale in major and in minor, key signatures, and metric signatures.

Course—B. This course in melody writing emphasizes especially the phrase, period, binary and ternary forms, employing free rhythm, and developing the art of melody structure on a harmonic basis. The analysis of melodies enables the student to grasp their harmonic structure. This is developed sufficiently to form an easy introduction to the harmony study required in the third year.

Course—C. The study of harmony from a given bass and a given upper part. Beginning with the study of intervals, the work includes: major scale triads; minor scale triads; triad inversions; the dominant seventh and its inversions; the secondary sevenths; harmonic analysis from simple classics.

Chorus. Required of all music students. One period daily is devoted to chorus singing and to instruction in the technical and interpretative elements of choral music. Topics for special consideration: the formation of the school chorus, the glee club, the classification of voices, the bibliography of choral music, and the preparation and performance of choral music.

1. **Lectures on Music.** Required of all students. A course of lectures on music appreciation, the essentials in music education, and community work in music.

2. **Lectures on Music.** Required of all students. A course of lecture lessons on vocal art and technique.

The course will include the following topics: position, breathing (two lectures); voice placing, breath control (two lectures); attack and support, resonance (one lecture); pronunciation, necessary to the best tone (one lecture); legato singing (one lecture); vocal technique, repertoire (one lecture); tone coloring, interpretation (one lecture).

Certificates

A certificate for work accomplished in any one of the three years, is granted to those who pass successfully the required examination at the close of the session.

A grade teachers' certificate is granted to those who complete a prescribed course for grade teachers and pass a satisfactory examination.

A special supervisor's certificate is granted to those who complete the three years' work and satisfactorily pass the examinations.

MATHEMATICS

Courses A, B, and C are planned for those teachers in secondary schools who may wish to review these subjects. They are equivalent to the advanced entrance requirements of Cornell University, and of the College Entrance Examination Board. They presuppose a ready knowledge of elementary algebra (through quadratic equations), and of plane geometry.

University credit, A, B, and C, three hours each.

A. **Advanced Algebra.** Except Sat., 9. *White 25.* Professor HUTCHINSON. Daily, except Sat., 10. Professor SNYDER.

B. **Solid Geometry.** Daily, except Sat., 9. *White* 27. Assistant Professor SHARPE.

C. **Trigonometry.** Daily, except Sat., 10. *White 25.* Professor HUTCHINSON. Daily, except Sat., 9. *White 24.* Professor SNYDER.

Courses D, E, and F are equivalent, respectively to (a), (b), and (c) of Course 1 in Mathematics, regularly given during the academic year. Course D presupposes A, B, and C; E presupposes D; and F presupposes E. The work will consist in large part of recitations from text-books.

University credit, D, four hours; E, three hours; F, four hours.

D. **Analytic Geometry.** Eight recitations each week; M T Th F, at 8 and at 11. *White 27.* Assistant Professor SHARPE. *White 21.* Assistant Professor CARVER.

E. **Differential Calculus.** Daily 10. *White 9.* Assistant Professor RANUM. Daily, 8. *White* 6. Dr. GILLESPIE. Daily 9. *White 6.* Dr GILLESPIE.

F. **Integral Calculus.** Daily, 8. *White 9.* Assistant Professor RANUM; Daily 9. *White 21.* Assistant Professor CARVER; Daily, 10. *White 2.* Dr. CRAIG; Daily, 11. *White 2.* Dr. CRAIG.

G. **Teachers' Courses.** These courses are intended for actual and prospective teachers in secondary schools. They are open only to those who have

already studied the subjects, and are not equivalent to any of the mathematical courses in college entrance requirements.

Algebra. Except Sat., 10. *White 1.* Credit, two hours. Dr. OWENS.

A critical treatment of certain chapters in high school algebra, a discussion of various pedagogic methods, and consideration of such questions as correlation with other subjects.

Geometry. Except Sat., 11. *White 1.* Credit, two hours. Dr. OWENS.

A brief historical survey of the development of geometry, followed by a general consideration of the logical basis of the subject, methods in making proofs and solving originals, and questions of pedagogic treatment.

H. **Projective Geometry.** Daily except Sat., 8. *White 24.* Professor SNYDER. In this course the principles underlying projective forms and constructions of the first and second degrees will be carefully developed. Particular attention will be paid to the application of these principles to elementary geometry, so as to make the work helpful to teachers of this subject. No knowledge of mathematics beyond plane geometry will be presupposed. Credit, three hours.

K. **Advanced Calculus.** Daily except Sat., 11. *White 25.* Professor HUTCHINSON. A brief discussion of the general theory of differentiation and integration together with selected topics relating chiefly to integral calculus, such as the properties of definite integrals, the gamma function, curvilinear and surface integrals, the transformation of multiple integrals, and Green's theorem. Credit, three hours.

PHYSICS

All courses are given in Rockefeller Hall. L. R. = Lecture Room.

Most of the courses announced below are given during the year as regular University work. Both recitation and laboratory work will be adapted as far as possible to meet the individual needs of teachers who wish to review special portions of the subject or who are unable to take complete courses.

Courses recommended for teachers are 1, 5, 6, 7, and 10, and those who have the requisite preparation to pursue more advanced work with advantage may take courses 14, 25 and 26.

Regular University students may receive credit for any of the courses that correspond to the work of the regular year, and requirements for entrance to any of these courses for these students will be the same as during the regular school year. (See end of each course announced for amount of credit.)

1. **Lectures in General Physics.** The aim of this course is to show the experimental basis of physical science. The work covers one-half of that given during the regular year and no previous knowledge of physics is required. To those who possess a general knowledge of the subject and to teachers, the course will afford a review useful in laboratory and advanced work and will give suggestions as to means of illustration of essential phenomena of physics which may be applicable where the equipment is much less extensive. The topics for 1911 will be properties of matter, electricity, and heat. Exc. Sat., 12. *L. R. B.* Credit, two hours. Professor SHEARER.

5. **Recitations in connection with course 1.** This course combines supervision of lecture note books and explanation of points not fully covered in

the lectures. Suitable exercises and problems with reference to text books will be given. Except Sat., 8. *Room 106.* Mr. MURDOCK. Credit, one hour.

6. **Recitations for those who have completed course 1, or courses 1 and 5, or their equivalents.** This course is intended to develop the theory of the subject and to give a fairly rigid drill in its application. Considerable attention will be given to graphic methods and to problems. Crew's Text Book of Physics will be used. The first half of the work of the regular year will be covered in 1911. Except Sat., 9. *Room 106.* Mr. MURDOCK. Credit, two hours.

7. **Teachers' Course in Physics.** Especially designed to meet the needs of teachers of physics in secondary schools. The course consists of two parts (either of which may be taken alone, although it is advisable to take them together), and is intended to present the subject from the point of view of the school instead of the college. As it is given in the afternoon, it may be taken in addition to many of the regular forenoon courses. The course can be made much more helpful to those who take it if they will correspond with the instructors in charge some time in June or earlier, stating what subjects or points they wish discussed in (a) and in (b).

Some high school teacher will assist in the work of this course.

7a. A detailed study of the courses in physics as given at present in grade, high, and normal schools. The following subjects serve to indicate the nature of the course: the use of the lantern in demonstration, including microscopic projection; selection of laboratory equipment and text books, records and note books, adjustment and setting up of laboratory apparatus, and the selection of subject matter. The new syllabus of the New York State Education Department will receive special attention. Nearly all the leading book companies have furnished specimen copies of their high school texts and laboratory manuals which will be available for inspection. M W F., 2–5. Mr. GIBBS and Mr. ———.

7b. A course on the construction of simple apparatus from common materials easily obtainable. The repairing of apparatus, and illustrations of how a little ingenuity may save money for expenditure on apparatus not easily made. Where the tinner and blacksmith may prove valuable aids to the teacher of physics. Individual instruction will be given in the use of some of the common tools and processes necessary to keep a laboratory going, such as filing, sawing, drilling and soldering metals, glass blowing, drilling and cutting, wire winding, etc. During the course some apparatus will be made and some will be so explained that it may be made by the student later, such as the Jolly Balance; Boyle's Law apparatus; cistern barometer; co-efficient of expansion of air apparatus, electric tuning fork, electroscope, contact keys, slide wire bridge, telegraph sounder, relay resistance coils and simple galvanometers. T Th., 2–5. Mr. ———.

8. **Recitations in General Physics.** This course is intended for those students who have had the requisite elementary training in general physics and who wish to pursue the subject more in detail with a view to going into more advanced work in physics or into engineering. The work in recitations is to be accompanied by work in the laboratory in course 14. Course 8 is the recitation work required of engineering students during the first term of the sophomore year. Credit, two hours. Courses 1 and 5, or 1 and 10, lead up to the course. Except Sat., 8. *Room 105.* Mr. MOLBY.

9. **Recitations in General Physics.** Continuation of Course 8. Required of engineering students during the second term of the sophomore year. Except Sat., 12. *Room 105.* Credit, two hours. Mr. MOLBY.

10. **Physical Laboratory.** This course is one primarily designed for teachers of elementary physics and for those students who desire to study more thoroughly elementary physical principles in the various branches. In general, the simpler forms of apparatus are used but of such a grade as to adapt them to the needs of careful investigators. The apparatus available affords study in units and their relations, statics, kinetics, molecular physics, light, sound, electricity, and magnetism. The work may at the beginning of the term be arranged for each individual, covering as many or as few of the general divisions of the subject as seems desirable. The work may be varied to meet the needs of the students as the work progresses since in all cases individual instruction is given. Each student will thus have the opportunity to devote his energies to his chosen part of the subject. Occasional discussions of general interest may be held covering such subjects as methods of making observations and of using them to the best advantage, accuracy of results, computations, errors, the interpretation of data by means of curves, the theory of particular experiments and other topics as they may occur.

University students having the requisite requirements for admission to course 10 in physics as given in the Courses of Instruction for the year 1910–11 may elect this course, following the schedule prescribed for regular work during the academic year.

One to five three-hour periods a week. Except Sat., 9–12. Assistant Professor BLAKER and Mr. GIBBS. Credit, one to three hours.

14. **Physical Experiments.** Theory and method of physical measurements. The course presupposes a thorough course in elementary physics, both in text and laboratory. It consists of setting up and adjusting apparatus and of performing fundamental experiments; a study of limitations, errors, and methods of computation; and interpretation of results, both analytically and graphically.

The apparatus available renders it possible to make accurate measurements in the different branches of general physics. A few of the subdivisions that may be covered are in friction, work, power, efficiency, uniformly accelerated linear and angular motions, moments of inertia, coefficients of expansion of solids, liquids, and gases, vapor tension and vapor density, the usual determinations in heat; the study of thermometers, their calibration and comparison, a thorough study of the analytical balance, including a determination of its errors and limitations. In sound, studies may be made in resonance and interference. The work in light comprises a study of lenses, the grating, the adjustment, and the use of the spectometer, photometry of various light sources. The equipment in electrical and magnetic apparatus is such as to afford special facilities for the determination of electrical and magnetic constants and for work in electrical measurements such as the measurement of current, electromotive force, resistance, self and mutual induction, capacity, study of the magnetic properties of iron, and the use of standard instruments of theoretical and practical nature.

The work being individual, it may be planned to suit the needs of the student and may cover as many or as few topics as seem desirable. Reports on the work done covering theory and results are to be submitted for criticism. Credit from one to four hours.

One to five three-hour periods a week. Except Sat., 9–12. Assistant Professor BLAKER and Mr. RICHTMYER.

18. **Theory and Practice of Photography.** The laboratory is equipped with cameras for various kinds of work such as copying, reducing, enlarging, landscape work, lantern slide making, microscopic enlargements from transparent slides and color photography. Well ventilated individual dark rooms are provided, also commodious exposing and printing rooms. This course is intended to give a working knowledge of the ordinary photographic processes serviceable in educational work. Four lectures at dates to be announced. Laboratory practice Tuesday and Thursday, 2 to 5. Assistant Professor MOLER.

25. **Advanced Laboratory Practice.** A course in general physics, open to those students who have had course 14 or its equivalent and who desire to take up special subjects for detailed study, putting much more time on individual problems than is advisable in course 14. It is intended for those students who desire at some time to do advanced laboratory work in research, and for teachers in laboratory physics in colleges. Such problems in research as can be completed in the time available may be undertaken by special arrangement. Apparatus of high quality is available for this work.

Credit varies with the amount of work done. The laboratory will be open daily from 9 to 12 excepting Saturday. Assistant Professor BLAKER and Professor SHEARER.

26. **Laboratory Practice in Applied Electricity.** M W F., 2–5. Assistant Professor MOLER. A course for those who desire a knowledge of dynamos, motors, transformers, induction motors, and other electrical appliances. The large dynamo laboratory of the department will be available for this work. Admission to the course will be restricted to those who have a satisfactory knowledge of elementary laboratory work including some practice in ordinary electrical measurements. In some cases it may be advisable to take course 14 for a portion of the session and course 26 for the remainder. Credit in proportion to the work done.

CHEMISTRY

All courses are given in Morse Hall. L. R. = Lecture Room.

The courses announced below correspond as follows with regular University courses: A to course 1; C and E to 6; C and D to 7; E (with part of F) to 12; F to 14; G to 17; H to 19; I to 20; J partly to 30; K partly to 31; L to 37; R to 65; S to 66; T to 70; U to 71; V to 75; W to 76.

The recitation and laboratory work will be arranged, within reasonable limits, to meet the individual requirements of teachers registered in the respective courses. For students wishing to obtain university credit, the requirements for admission to the courses will be the same as during the regular University sessions. For teachers not intending to have their work apply toward a Cornell degree, these requirements will not be rigidly enforced.

A. **Introductory Inorganic Chemistry.** a. Lectures. Except Sat., 12, *L. R. 1.* Professor BROWNE and Mr. SUTHERLAND. The lectures deal with the fundamental theories and laws of chemistry and with the more common elements and their compounds. They are profusely illustrated by experiments. The course is primarily designed to meet the needs of teachers in secondary schools, and to that end emphasis is laid upon methods of lecture presentation and experimental demonstration. Students other than teachers must, before registering, satisfy the department that they are properly prepared to carry on the work.

b. Laboratory work. M W F., 8–12, and T Th., 9–12. Mr. WELSH and Mr. HOULEHAN. A series of experiments designed to illustrate the fundamental laws of chemistry and to acquaint the student with the properties of the principal elements and their compounds. For the benefit of teachers who may take the course especial attention will be given to methods of laboratory instruction, qualitative experiments, and the blowing of simple glass apparatus.

c. Recitations. T Th., 8. *L. R. 4.* Mr. WELSH. The recitations deal with the subject matter of the lectures and with the experimental work in the laboratory; thorough drill in the solution of chemical problems. Credit, six hours.

C. **Qualitative Analysis.** Lectures, M W F., 11, *L. R. 4*, Dr. LUNDELL and Mr. LEMON. Laboratory, except Sat., 1.30 to 4.30, Mr. LEMON and Mr. RIEGGER. Elementary course for those who have had the equivalent of course A. A study in laboratory and classroom of the methods for detecting and separating the principal bases and inorganic acids. This is followed by the analysis of various substances, either in solution or in solid form, the composition of which is unknown to the student. Considerable emphasis is laid upon the writing of equations expressing the reactions involved in the work. Credit, three hours.

D. **Qualitative Analysis.** Lectures and recitations. T Th., 8, *L. R. 2.* Dr. LUNDELL. Laboratory work for students taking courses C and D with the intention of securing the equivalent of the regular University course 7. Daily except Sat., 1.30 to 4.30, and M W F., 8–11. For students taking work in course D alone, afternoon periods only. Mr. LEMON. Credit, one, two, or three hours. 1. A study in laboratory and class-room of the methods of detecting each of the important acids in the presence of the others, together with the reactions involved, followed by the analysis of more complex mixtures than those assigned in course C. 2. A comparative study in the laboratory of different methods of detecting and separating the bases.

E. **Quantitative Analysis.** Elementary. Lectures, T Th., 11, *L. R. 4.* Laboratory, M W F., 8–11. Credit, two hours. Dr. LUNDELL and Mr. MARSH.

An introduction to quantitative methods and the chemistry upon which these methods are based. Lectures, explanatory of the methods used, are first given; each student then performs simple analyses which involve the use of the apparatus ordinarily employed in analytical work.

Advanced work (see course F) may be taken by students who complete this course before the close of the session.

F. **Quantitative Analysis.** Advanced. Laboratory practice. Credit, one, two, three, or four hours. Dr. LUNDELL and Mr. MARSH.

This course comprises instruction in certain gravimetric, volumetric, and electrolytic methods of analysis, and in the methods of combustion analysis. The work includes the analysis of iron ores, iron and steel, slags, paints, lubricants, coal and coke, cements and cement materials, alloys, ores of copper, lead, zinc, mercury, manganese, tin, etc.

G. **Spectroscopic Chemical Analysis and Colorimetry.** Lectures, M W F., 12. *L. R. 3.* University credit, two hours. Laboratory practice at hours to be arranged. Dr. SHETTERLY.

The laboratory instruction comprises the observation and mapping of emission spectra with the Krüss spectroscope and direct-vision spectroscope, the qualitative analysis of unknown mixtures and of minerals with each of these instruments, the spark spectra and oxyhydrogen spectra of minerals, the spark spectra of liquids and gases, and the absorption spectra of certain solutions, of solutions of the rare earths and of organic dyes. The course also includes work in the fields of spectrum photography and colorimetry as well as a study of the refractometer and the polariscope.

H. **Qualitative and Quantitative Gas Analysis.** Lectures, M W F., 10. *L. R. 3.* Credit, one hour. Dr. SHETTERLY.

A detailed discussion of many representative types of apparatus employed by the gas analyst, and of the various methods of analysis involved in their use. Numerous simple problems are assigned which afford practice in the calculation and interpretation of the results obtained in gas-analytical work.

I. **Technical Gas Analysis.** Laboratory practice at hours to be arranged. Credit, two hours. Dr. SHETTERLY and Mr. ANDERSON.

Instruction is given in the analysis of gas mixtures with the apparatus of Honigmann, Bunte, Orsat, Lunge, and Hempel; in the complete analysis of flue gas, illuminating gas, generator gas, acetylene, and air; in the determination of the heating power of gaseous, liquid, and solid fuels, and in the evolution of nitrates with the nitro-meters of Hempel, Lunge, and Bodländer. Within certain limits the work may be selected to suit the requirements of the individual student. Courses H and I should be taken at the same time.

J. **Organic Chemistry.** Lectures and recitations. Daily, except Sat., 8. *L. R. 3.* Laboratory practice at hours to be arranged. Professor ORNDORFF and Mr. HITCH.

The aim in this course is to present as fully as possible in the time available the fundamental principles of the chemistry of the compounds of carbon. The most important organic compounds are considered with reference to their methods of preparation, their properties, and their structural formulas. The lectures are fully illustrated by experiments, specimens, and models. The course covers essentially all the work in Remsen's Organic Chemistry, which is used as a text-book. The laboratory work follows the lectures closely. It comprises the preparation and purification of a number of typical organic compounds, and the detailed study of their properties, reactions, and relations. Orndorff's Laboratory Manual of Organic Chemistry is used as the laboratory note-book. This course is designed for teachers of science, and for students in arts and medicine, in veterinary medicine, pharmacy, agriculture, and engineering. Credit, four, five, or six hours.

K. **Organic Chemistry.** Lectures and recitations. Except Sat., 8. *L. R. 3.* Credit, two hours. Professor ORNDORFF.

These lectures and recitations are the same as those of course J. Course J should be taken in preference to course K whenever it is possible.

L. **Methods of Organic Analysis.** Laboratory practice with occasional lectures. Hours to be arranged. Credit, two or more hours. Professor ORNDORFF.

This course comprises the qualitative and quantitative analysis of pure organic compounds, and of such commerical products as alcohols, ethers, organic acids, glycerol, formalin, acetates, soaps, turpentine, rosin oils, etc.

R. **Microchemical Methods.** Laboratory practice at hours to be arranged. Credit, two hours. Dr. RATHJEN.

The aim of this course is to familiarize the student with the use of the microscope and its accessories, and with microchemical methods and apparatus as applied to chemical investigations.

S. **Microchemical Analysis.** Elementary course. Laboratory practice at hours to be arranged. Credit, three hours. Dr. RATHJEN.

Practice in the examination and analysis of inorganic substances containing the more common elements with reference to rapid qualitative methods and the analysis of minute amounts of materials.

T. **Foods, Beverages and Food Accessories.** Lectures. Daily, except Sat., 12. *L. R. 2.* Credit, two hours. Mr. REDFIELD.

In this course the source, preparation for use, and the chemistry of foods, beverages, and food accessories, are discussed. This is then followed by a consideration of the individual and relative assimilability, digestibility and nutritive value of food products; the relation of pure and adulterated foods to the public health; the adulteration, sterilization and preservation of foods; and lastly, by a discussion of dietics, dietary standards and the methods for carrying on nutrition investigations.

U. **Food Analysis.** Laboratory practice at hours to be arranged. Credit, three hours. Mr. REDFIELD and Mr. ANDERSON.

Instruction is given in the examination of foods by chemical and optical methods, with reference to adulteration, imitation, and alteration; the examination of foods for artificial coloring matters, preservatives, and poisonous substances. This course comprises a study of milk, comestible fats and oils, cereal products and starchy foods, canned goods, jellies, etc. This course may be extended so as to include the analysis of alcoholic beverages.

GEOGRAPHY

Lecture Room and Laboratories are in McGraw Hall.

It is the purpose in outlining the instruction in this department to meet, primarily, the needs of teachers in grammar schools, high schools, normal schools, and colleges. A second aim is to provide courses of practical and cultural value to college students. The work embraces lectures, laboratory, and field instruction in physical, regional, and industrial geography, also a general introductory course in dynamic, structural, and historical geology.

The environs of Ithaca are rich in phenomena of both geographic and geologic interest. Consequently field excursions are made a feature of the Summer Session. (See outline of field studies below.)

The laboratories are well equipped with apparatus and illustrative material for class instruction and research. As such may be enumerated teaching and reference collections of minerals, rocks, fossils, maps, photographs, models, and more than five thousand lantern slides.

The different courses as announced will be directly in charge of the instructors whose names are indicated in connection with each. Special lectures will, however, be given by different members of the instructing staff of the department and by others who are particularly and personally acquainted with certain topics. Among these topics may be mentioned the Settlement of the Great West, Irrigation and Dryland Farming, Glacial Alaska, The Mississippi Delta Region, Phenomena of Yellowstone Park, Conservation of our Forests, etc.

A. **Physical Geography.** An introductory course in general physical geography, covering most of the subjects treated in modern texts, except the atmosphere (see course B). Some of the topics discussed are: principles of geography; structure and form of the earth; relief features; the ocean, its basins, deeps, islands, composition, temperature, movements, exploration, life, and navigation; short line types, development, harbors; rivers and valleys; plains and plateaus, mountains; snow fields and glaciers; volcanoes and earthquakes. An attempt is made to describe the leading processes, to account for the land and water forms and to show their consequences. The lectures are fully illustrated by lantern, maps, models, and specimens. Persons taking this course are advised to take also the related courses B, C, and D. *Geological Lecture Room*, M T W Th., 9. Professor CONDRA, Mr. VON ENGELN. Credit, two hours.

B. **Physical Geography, Laboratory Course.** There will be two divisions in this class, the first comprising all those who desire university credit for their work, the second including teachers and others who are desirous of gaining an acquaintance with the laboratory methods and materials of physical geography. The members of the first division will do regular, systematic work following the Tarr and von Engeln Outlines for Laboratory Work in Physical Geography. The teachers' division will consider problems in the laboratory presentation of various topics, and will in general be adapted to the individual needs of the students. Among the laboratory subjects are: the interpretation and use of topographic maps, experiments in the wet laboratory illustrating erosion, stream transportation, deposition, valleys, flood-plains, alluvial fans, deltas, etc.; experiments in mountain folding and faulting, the location and characteristics of the physiographic provinces of the United States, topical consideration of volcanoes, glaciers, coast-lines, etc.

Physical Geography Laboratories, T Th., 2–4. Other periods to be arranged if necessary. Credit, one hour. Mr. VON ENGELN, Mr. FILMER.

C. **Physical Geography, Field Course.** This work includes one Monday afternoon excursion each week, three Saturday excursions, and two or three longer two-day voluntary excursions, all under careful supervision and devoted to specific studies of physiography and geography in the field. The subjects are: mantle rock and bed rock structures; weathering; the work of streams; river forms in different stages of development; waterfalls;

Lake Cayuga and its shore line; typical glacial deposits, including moraines, drumlins, kames, eskers, and outwash plains; the physiographic history of the Ithaca region. Persons not familiar with physical geography should read an elementary text on the subject before coming to the Summer Session, as time limitations make it necessary to presuppose some acquaintance with the subject on the first excursions. Those desiring credit must make field notes and written reports. Excursions 1–6 inclusive are required of all students in course C; in addition they must make either two of 7, 8, or 9; or one of 10, 11, or 12 for one hour's credit.

Conducted by Professor CONDRA, Mr. VON ENGELN, and Mr. FILMER.

MONDAY AFTERNOON EXCURSIONS

Outlines of Excursions in Physical Geography by Tarr, von Engeln, and Rich, are used on all excursions.

1. **Physiography of the Campus and Immediate Vicinity.** The work of streams and the development and form of valleys. Influence of bottom structure, slope, volume of water, sediment load, etc. in determining the nature of a stream course. Excursion No. 1 in outlines.

2. **Excursion to Eagle Hill.** To become acquainted with the lay of the land about Cornell. The broader physiographic features of the region; the maturely dissected plateau, the lake valley, the lake delta. The development of the present topography of the plateau. Excursion No. 2 in outlines.

3. **Excursion to Fall Creek and Deadhead Hill.** To study the origin of sedimentary rocks and the stages of valley form. The cyclic nature of physiographic changes. Weathering, erosion, and transportation. Deposition and cementation. Excursion No. 4 in outlines.

4. **Excursion to Shore of Lake Cayuga.** To study shore line phenomena. Wave form and movement; effects of wave erosion and transportation; the filling of lakes and the accompanying formation of strata; influence of stream action in lake filling; the resulting shore forms; nature and origin of joint planes; formation of stalactites. Excursion No. 5 in outlines.

5. **Excursion to North Spencer.** The Susquehanna Divide. To study the characteristic of a typical terminal moraine; its dissection by post-glacial streams, its relation to the preglacial Cayuga Valley; overflow channel and outwash deposits; cultural adaptation to topography and streams. Expense for this excursion (others have slight expense), about $1.10. Excursion No. 17 in outlines.

6. **Excursion to Six Mile Creek.** To study the effects of glaciation on a stream course. Evidence of interglacial gorges; diversion of stream by moraine deposits; valley form in drift and bed-rock; influence of the conditions on the questions of water-supply and water-power. Excursion No. 15 in outlines.

ALL-DAY EXCURSIONS

7. **Excursion on Lake Cayuga** by steamer, to study the deltas now forming in the lake; the Devonian strata of the lake shore, their fossil content and variations in structure; the folding of the rocks; the joint planes; the Taughannock gorge and falls; the salt works; and Portland cement works. Expense about $.75. Excursion No. 3 in outlines.

8. **Excursion to Enfield** by wagon, to study the preglacial valley; interglacial gorge; postglacial gorge; influence of hard layers on valley form; influence of joint planes; elevated deltas; lateral moraine of Cayuga lake lobe of great ice sheet; hanging valleys; glacial erosion. Expense about $1.10. Excursion No. 19 in outlines.

9. **Excursion to Freeville** by wagon, to study the upper Fall Creek valley; its change from a young lower course to a mature upper course; the extension of the terminal moraine across the valley; characteristics of eskers, of kames, and of outwash plains; the relation of these deposits to the moraine; influence of glacial deposits on agriculture. On this excursion a visit to the George Junior Republic is usually made. Expense about $1.10. Excursion No. 20 in outlines.

LONGER VOLUNTARY EXCURSIONS

10. **Excursion to Niagara.** The two plains; the rapids; the cataract; the gorge; the buried gorge; the whirlpool; the abandoned fall at Foster Flat; the lower river; the strata of the gorge; the beaches of higher level of Lake Ontario; the origin and history of Niagara; the influence of Niagara on industry. Opportunity will be afforded to visit the immense power plant and some of the factories that have developed near the falls. (Friday and Saturday.) Excursion No. 16 in outline.

11. **Excursion to Watkins Glen.** By railroad or automobile. Moraines and through valleys. A study of Watkins and Havana Glens which are among the most beautiful in the country; a consideration of their cause. A comparison of Seneca and Cayuga lake valleys. Influence of these valleys on the industrial development of the region. Contrast with the upland. (Friday and Saturday.) Excursion No. 6 in outlines.

12. **Excursion to New York City.** Glacial plains, non-glaciated areas, anthracite coal region, Appalachian mountains, Palisades, New York City. This excursion is planned for western students but will not be run unless the registration is fifteen or more. (Friday and Saturday.)

D. **Meteorology and Climatology.** Lectures, laboratory work, and field observations; designed to meet the needs of teachers of physical geography; offers suggestions as to subjects of meteorological study that come within the scope of facilities afforded by public schools; where and how meteorological and climatological data may be obtained for school use; acquaints the student with the general circulation of the atmosphere; the development, progression, and conditions that attend cyclones, hurricanes, tornadoes and special storms; the construction of weather maps and climatological charts; practical weather forecasting from weather maps and from local observations; use and care of meteorological instruments; general and special climatology and its relation to agriculture. Special attention is given to the practical application of the principles of meteorology as exemplified by the work of the United States Weather Bureau and other similar organizations.

Lectures, M W F., 11, *Geological Lecture Room.* Laboratory, W., 2–4:30. Credit, two hours. Dr. W. M. WILSON, Professor of Meteorology and Section Director of U. S. Weather Bureau.

E. **Geography of North America.** The physical features of the continent in their relation to history and industry. A summary study of the leading geographic facts of each political division and a fuller treatment of the topographic and soil regions of the United States proper, giving for each, its structure, physiographic history, topography and drainage, resources, and industrial development. Methods of reclamation and conservation are considered in their geographical relation. Attention is given to supplementary reading and to the literature of the subject in general. The course is suited to teachers and college students. It is fully illustrated with lantern slides, maps, folios, and models. Credit, two hours. Laboratory and library periods to be assigned. *Geological Lecture Room,* M T W Th., 10. Mr. VON ENGELN and Professor CONDRA.

F. **Industrial Geography.** This course, suited to the needs of grade and high school teachers, is both industrial and commercial. It includes a discussion of our national resources and their conservation, and a more detailed description of certain type industries. Some of the subjects are: coal and petroleum, iron and steel, forest products, tea and coffee, the sugars, cotton, rice, wheat and flour, corn, swine and cattle, dairying. An attempt is made to trace the commercial raw materials through the various processes employed, and the successive forms assumed in their origin and manufacture into finished products. This is done by the use of illustrative materials and well selected sets of lantern slides. Commercial values and commercial relations are discussed, following the other details of each industry. Excursions are made to the cement plant, salt works, the departmental plants of the College of Agriculture, and other places of industrial interest near Ithaca. Credit, two hours. Library and museum hours to be arranged. *Geological Lecture Room.* M T W Th., 8. Professor CONDRA.

Round Table Conference in Geography. There will be several evening conferences for instructors and students in geography, at which discussions of important general topics relating to the teaching of geography will take place. Some topics discussed in previous years were Nature and Scope of Geography, Principles Determining the Course of Study in Geography, Excursions, Laboratory Work in Geography, Sources of Geographic Knowledge.

Attendance on this course is purely voluntary, but all students in the department are invited. This free interchange of views among teachers and students is expected to throw much light on problems of teaching and on working methods.

General Lectures. A course of weekly lectures on topics of general geographic interest will be given during the session by members of the Faculty. A list of these lectures will be announced early in the session.

GEOLOGY

The Lecture room and Laboratories are in McGraw Hall.

Courses A, B, and C are designed especially to meet the needs of teachers in high schools and normal schools, and are so arranged that they form a single group to which one may devote one's entire time during the Summer Session. Those wishing to follow out a particular phase of the subject more in detail will find Course D helpful. In this course individual instruction will

be given, especially along the lines of geologic and contour mapping, field problems in stratigraphy and paleontology, etc.

The abundant collections of fossils and structural phenomena in the Museum, the well-equipped laboratories containing teaching and reference collections of minerals, rock specimens, fossils, models, and lantern slides, together with the exceptional opportunities afforded by Ithaca for field work in geology and paleontology, all offer excellent advantages to the student.

A. **Elementary Geology.** A general introductory course. Some of the topics discussed are: general features of the earth; igneous, sedimentary, and metamorphic rocks; weathering and erosion; underground water; glaciers; oceans and lakes; structural features of sedimentary rocks; changes in level of the land; vulcanism; metamorphism; origin of the earth; the five great eras of geologic history. The lectures are fully illustrated by lantern slides, models, and specimens. The laboratory periods will be devoted to the interpretation of topographic and geologic maps, and the study of the life forms developed in each geologic era, with field excursions to collect specimens from various horizons near Ithaca, whose rocks are especially rich in fossils.

Lectures, M T W Th., 11. *General Laboratory.* Laboratory, F., 2–4.30, *General Laboratory.* Credit, two hours. Mr. PERRINE, and Mr. STORRER.

B. **Minerals and Rocks.** An elementary course leading to an acquaintance with the properties and more important uses of the substances forming the earth's crust. Emphasis is laid upon the laboratory work, to which a large portion of the time will be devoted. Each student will be given about seventy-five minerals and a smaller number of rock specimens for identification by means of their physical properties. A part of the time will be spent in examining these substances as shown in the larger study collections. It is thus possible to become familiar with the more common types by actually handling many specimens of each. The laboratory fee gives the student permanent possession of a set of the minerals and a few of the more important rock specimens.

Lectures, M W Th., 10, *General Laboratory.* Laboratory, T Th., 2–4.30, *General Laboratory.* Credit, two hours. Mr. PERRINE and Mr. STORRER.

C. **General Geology, Field Course.** This work includes one Wednesday afternoon excursion each week, six Saturday excursions, and possibly one or more voluntary two-day excursions, devoted to specially chosen studies of geology, paleontology, and stratigraphy. For list of subjects discussed, see synopsis of excursions as given below. The excursions are open to all students of the Summer Session, but credit will be given only to those who have had the equivalent of, or are taking, courses A and B. Written reports of all excursions are required of those desiring credit. Meeting places for the first excursion. *General Laboratory*, 2 p. m. Credit, two hours. Mr. PERRINE and Mr. STORRER.

SYNOPSIS OF FIELD EXCURSIONS IN COURSE C

Wednesday afternoon excursions

(1) Excursion to Alumni Field and Beebe Lake. Gulley formation; resemblances to large valleys; relations of slope, velocity, and volume; falls and

rapids; effect of vegetation; stream deposits; deposition in progress.

(2) Excursion to Triphammer Falls and Fall Creek Gorge. The gorge and its relation to the stream; effect of the falls on the rocks of the gorge; weathering and erosion; transportation and deposition; cementation, significance of unconformities.

(3) Excursion to South Hill Quarry and beyond. Stratified rocks; joint planes, their influences; ripple marks in rocks at the quarry; glacial scratches; glacial soil. A study of the general geological features of the region as seen from South Hill.

(4) Excursion to Buttermilk Creek. A study of gorge conditions; the preglacial valley; the interglacial gorge; the postglacial gorge and waterfalls. En route, the river terraces in Six Mile Creek; conditions necessary for artesian wells; the plain on which Ithaca is located.

(5) Excursion to Coy Glen. A study of the elevated deltas; a study of their form, and the evidence of former ice dams, which held up the waters of Cayuga Lake to higher levels; influence of these deltas in causing the Coy Glen gorge to be formed; a study of the gorge and its waterfalls; comparison between the lake history of the Cayuga valley and that of the Great Lakes.

(6) Excursion to Ithaca Falls and Deadhead Hill. Stratification and consolidation; oxidation; cementation; cross-bedding; pot-hole formation; waterfalls; the tunnel and its relation to the falls.

All-Day Excursions

(7) Excursion to Portland Point Quarry by trolley. Relation of upland topography to Cayuga Lake Valley; nature of stream valleys near lake; rock structure at quarry; kinds of rock; glacial evidences; weathering; the lake and its deltas; collection of fossils from the quarry and gorge; study of the gorge.

(8) Excursion to Taughannock Falls by automobile. A study of the upper gorge of Taughannock Creek, and the relations of the Falls to the amphitheatre, as seen from above the Falls.

(9) Excursion to Salmon Creek by launch. A study of lake deposits; weathering, as shown along the lake shore en route; joint planes; the Devonian rock exposures and their fossil contents; Esty's Glen; the salt works; the Portland Cement works; collection of fossils along the shores of Salmon Creek; a study of the gorge south of Ludlowville.

(10) Excursion to West Danby by wagon. A study of the form and characteristics of a typical terminal moraine; interpretation of the principal geologic features noted en route.

(11) Excursion to Rochester by train. The gorge of the Genesee River at Rochester, a typical lower Silurian section; collection of fossils from the various horizons; interpretation of the stratum of Clinton iron ore (hematite) glacial deposits seen en route.

(12) Excursion to Union Springs by boat or train. A study of the Upper Silurian and Lower Devonian strata exposed at the lower end of Cayuga Lake; folding of the rocks; variation from shale to limestone and sandstone; the gypsum beds and plaster works.

Longer voluntary excursions

Two-day excursions may be arranged to Niagara Falls and the Wilkesbarre coal region, if a sufficient number of students register for them.

D. **Special Research and Field Work.** Work may be divided along various lines, such as: field work in making contour and geologic maps; collecting and identifying fossils from the region about Ithaca; laboratory work with fossils, minerals, and rock specimens; etc. Credit, one or more hours. Mr. PERRINE.

Laboratory fees: Course A, 50 cents; course B, $2.25. The fee for the term in course C is at the rate of $1.00 for every five hours a week.

NATURE-STUDY

A. **The Nature-Study Idea.** Lectures on the history and development of the nature-study idea; its educational importance; its pedagogics; arrangement of courses of study; the field trip; the school garden; the procuring and using of material; the literature of the subject; other topics of fundamental importance. Special attention will be given to the course of study outlined in the New York State syllabus of 1910. In connection with this course opportunity will be given to prepare the material and literature of one or more special topics. *Stimson Hall*, M W F., 11. Professor HAWKINS.

B. **Nature-Study Material.** Field and laboratory work. Some of the topics forming the basis of the work are study of natural objects in the field; collection of material; preparation and preservation of material; equipping and maintaining aquaria, vivaria, terraria, etc.; organizing and maintaining school museums; outlining and carrying out field and laboratory lessons. While this course is planned especially to aid teachers and supervisors, it will also be of value to any others interested in outdoor study. The greater part of each exercise will be held in the field. *Stimson Hall*, M W Th., 2–5. Professor HAWKINS.

Nature-study students will unite with the botany students in three all-day excursions on Saturday. (See announcement under Botany, page 41.)

Students who satisfactorily complete courses A and B, and participate in at least two of the three Saturday excursions, will receive three hours credit.

The following courses are of especial value to those interested in nature-study: Entomology, Course A; Botany, Course B; Zoology, Courses A and B.

BIOLOGY, ELEMENTARY COURSES

Courses I, II, and III are intended to give a systematic presentation of the subject-matter of each branch of the general field of Biology.

Students desiring to take the lectures in all three of the elementary courses (I–III) must take the prescribed laboratory work in at least one course.

I. Botany

A. **Physiology and General Morphology of Plants.** A general elementary course in botany. The aim of the earlier part of the work will be to familiarize the student with the general principles underlying the processes of absorption, nutrition, growth, etc., in plants, as well as with the methods of perform-

ing experiments to illustrate these phenomena. The latter part of the work will be devoted to a comparative study of the form and reproduction of representative species of all the great plant groups, algae, fungi, liverworts, mosses, ferns, gymnosperms, and angiosperms. Emphasis will be placed on the homologies of the vegetative parts and organs of reproduction. Lectures, M W F., 8. Laboratory, M W F., 9–12. One oral review weekly at an hour to be fixed. Credit, three hours. Dr. McALLISTER.

See excursions announced under special courses, page 41.

B. **Special Morphology, Taxonomy, and Ecology of the Higher Plants.** A comparative study of the vegetative and floral structures of the angiosperms. Types are selected representing the various groups of the angiosperms, studied from the point of view of their comparative form and their adaptation to special functions. Field studies will be undertaken for the purpose of illustrating and amplifying the work done in the laboratory. Excursions from time to time will be made to nearby localities. Drawings, notes, and photographs will be utilized in connection with the course. Lectures, T Th., 8. Laboratory and field work, T Th., 9–12. Credit, two hours. Dr. BROWN.

Students taking the laboratory work in Botany A and B and desiring to take lectures in any of the other elementary courses, will be excused from the laboratory during the necessary hours.

II. Zoology

A. **A General Course** designed to meet the needs of teachers in high schools. Particular attention will be paid to the forms treated in the New York State Syllabus. The lectures will treat of the development, systematic position, habits and life-histories of animals. The laboratory periods will be devoted to a study of their form and structure. Five daily lectures, M F., 9. *McGraw Hall, Room 5.* Five laboratory periods, M F., 2–5.30. Laboratory fee $4.00. This course will not be accepted as the equivalent of Course I Zoology, of the regular university year. Credit, five hours. Assistant Professor REED and Mr. ALLEN.

III. Human Physiology

A. **Lectures upon the structure and functions of the human body.**

In this course the fundamental facts of physiology are reviewed, especial attention being paid to the vital processes in the human body. While the scope of the lectures is extended so as to cover practically the entire subject of the functions in man, it has been found most profitable to confine the discussions mainly to those matters, a knowledge of which is of value because of their relation to questions of hygiene.

In the beginning, a short review of certain important conceptions in general physiology will be given. This is followed by a consideration of the subjects given below, and in practically the order given.

The chemical and physical properties of protoplasm, the nature and action of enzymes, the formation and functions of the digestive secretions, the structure and functions of the digestive canal, foods, the blood and lymph, the vascular system, respiration, the phenomena of metabolism (including the ductless glands), the nervous system and special senses.

The aim of the course is the presentation of those facts in physiology which are of value to teachers of the subject and to those desiring to acquaint themselves with the present-day views in this field. The lectures will be illustrated by lantern slides, charts, apparatus, and experiments. Except Sat., 10. *Stimson Hall, Amphitheater.* Dr. HUNTER.

B. **Laboratory Work.** Practical work upon the general life conditions and manifestations, foods, digestions, etc., is offered. This course includes the physiological experiments, demonstrations, and laboratory work in physiology called for by the Syllabus of the State of New York. It may be taken separately or in connection with the lecture course. T Th S., 9–12. *Stimson Hall, Room 34.* Dr. HUNTER and Mr. MAYES.

BIOLOGY, SPECIAL COURSES

Botany

The Lecture Rooms and Laboratories are in the southeast wing of Sage College.

The courses are especially designed to aid teachers in their work with elementary classes, and at the same time to furnish information and training to those not intending to teach. Field methods will be exemplified as far as practicable in each course, and in connection therewith valuable material may be secured for future use. Short excursions may take the place of periods in the laboratory.

Three all-day excursions on Saturday, for purposes of special study, have been planned for students in all the courses. Special announcements and outlines for study will be furnished for each excursion.

I. Aquatic vegetation, Cayuga, July 15. Expense, about 75 cents.

II. Peat-bog and marl pond vegetation, South Cortland, July 22. Expense, about 75 cents.

III. Ravine and rock vegetation, Enfield, N. Y., July 29. Expense, about $1.10.

All students desiring credit in any of the courses in botany must participate in at least two of the excursions.

It is desirable that students taking courses C, D, and E, should have had some previous training in botany. Lectures in the various courses will be illustrated with photographs, lantern slides, projection apparatus, and as far as possible with living material.

C. **Taxonomy and Embryology of the Bryophytes and Ferns.**

a. **Taxonomy.** Practice in the collection and identification of the liverworts, mosses, and ferns. Most of the work of this course will be done in the field, where the plants will be studied in the growing condition amid their natural surroundings, in order that the students may become familiar with the structural characters, relationships and habitats of the commoner genera and species, especially those usually employed in class work. The numerous wet ravines and rich woods in the vicinity of Ithaca abound in fern and bryophyte vegetation and are easily accessible.

b. **Embryology.** Properly prepared students may make a study of certain phases of the embryology and development of typical plants of the

above groups, or of the gymnosperms or angiosperms, if found desirable. Work will be assigned to suit individual needs.

All students taking this course will be required to join excursions II and III. Lectures M W., at 12. Laboratory and field work M W., afternoons. Dr. McALLISTER. Credit, two hours.

D. **Trees and Shrubs. (Taxonomic and Biological Study of Trees.)** The tree as an organism which has adapted itself to special conditions in nature. In studying the kinds of trees, their adaptation to special conditions will be kept constantly in view. Much of the work will be done in the field. The sylvan conditions in the immediate vicinity of the University afford a fine opportunity for acquiring familiarity with many kinds of trees growing under a variety of conditions. A brief study of the structure and development of wood will also be undertaken. Excursions II and III are required. Lectures M W F., at 2.30. Laboratory and field work, M W F., afternoons. Credit, three hours. Professor ROWLEE.

F. **Histology and Cytology.** Studies of the vegetable cell, its multiplication, and contents; structure and development of the tissues of higher plants. Instruction in the preparation of permanent microscopic mounts will be given and a set of slides prepared. Lectures, M W F., 8. Laboratory M W F., 9–12. Credit, three hours. Dr. BROWN.

G. **Organography and Identification of the Higher Plants.** A study of the kinds of plants with special reference to morphology, identification, habitat, and range of species. Extra field work will be substituted for some of the lectures. An herbarium will be prepared if the student elects to do so. Excursions I and II are required. Lectures T Th., 2.30. Laboratory and field work, T and Th., afternoon. Professor ROWLEE.

Physiology

All work is in Stimson Hall.

For lectures and general courses see Biology III, page 40.

The department is equipped for work in most of the fields of physiology, and the staff welcomes those who desire special work, which may be arranged to suit the specific needs of each individual.

C. **Experimental Physiology.** Laboratory work. The course will cover: (a) the blood and lymph; (b) muscle and nerve; (c) heart and circulation; (d) respiration; (e) vision. Any one division of the work may be taken or selected experiments performed. Five or more hours a week. Mornings, at hours to be arranged. *Stimson Hall.* Dr. HUNTER and Mr. MAYES.

The work done in this course is technical and will be accepted, hour for hour, in place of the laboratory work required of students of medicine at Ithaca.

D. **Advanced Work.** Opportunity for advanced work in physiology and biochemistry is offered to those who are prepared to do work along special lines. The course will be arranged to suit the specific needs of the individual and credit will be given for the work done. Five or more hours a week, at times to be arranged. Dr. HUNTER.

The department is well supplied with modern physiological apparatus for demonstration, illustration and experiment in the various divisions of the

subject. To the equipment of the laboratories, which are spacious and well lighted, there has been recently brought an extensive additional collection of the latest types of apparatus. This includes recording apparatus, such as kymographs, cardiographs, pneumographs, and various instruments used in physiological work. The equipment is very thorough and includes a well fitted chemical laboratory.

Vertebrate Zoology

For elementary course see Biology II page 40.

B. **Ornithology.** Lectures, T Th., 12; laboratory work, one period an hour to be arranged and two field excursions, weekly. *McGraw Hall, Room 5.* University credit, two hours. Laboratory fee, $1.50.

The lectures will treat of the external structures and life-histories of birds. Attention will be given to such subjects as migration, coloration, molt, habit, habitat, correlation of structure and bird economy. The lectures may be taken independently or in connection with the laboratory work. Representatives of the important families of North American birds will be studied in the laboratory, with the aid of a manual. Each student should be provided with Chapman's Handbook of Birds of Eastern North America and with field or opera glasses. Assistant Professor REED, Dr. WRIGHT, and Mr. ALLEN.

C. **Field Zoology.** Animal ecology: The course includes special preparation for field collecting and field teaching, the interrelations of our vertebrates; the environmental factors of their habitat; their life-histories, habits, and economy. The field trips are partially to give practice in the field observation and ready identification of animals in their natural state and partially to introduce some of the methods of ecological work. The woods, streams, the lake, hills, and ravines, all within a radius of one mile of the campus, offer exceptional opportunities to the student who wishes to become familiar with the fishes, salamanders, frogs, reptiles, and mammals. The lectures will treat of the habits and relation of animals to their environment and the literature of the general subject. Two regular field excursions each week and two or three longer trips at hours to be arranged. The number and hours of lectures each week will vary with the needs of the class. Any student in Zoology or related science is welcome to attend. Credit, two hours. Dr. WRIGHT.

Entomology

College of Agriculture, Main Hall

Most of the courses announced in this department are the equivalents of courses offered during the academic year, and for regular university students the requirements for admission and the nature of the work will be the same as during the winter. Students from other institutions who wish credit in advance for courses B and C (or courses 4 and 5 in the announcement of courses for the academic year) must present drawings showing the work done. Credit for laboratory work will be allowed at the rate of one university hour for each thirty-six actual hours.

Courses B and C are parallel courses and will be adapted as far as possible to meet the individual needs of teachers or others who wish to do general

elementary work. Regular students may elect these courses, but, if they wish to take more advanced courses later, must elect sufficient hours of courses 4 and 5 to complete the requirements for admission to advanced work.

The laboratories and lecture room of the entomological department are located on the third floor of the central building of the New York State College of Agriculture.

A. General Entomology. A general course designed to meet the needs of teachers in high schools, who desire to study the structure, life-history, and habits of insects.

(a) Lectures on the characteristics of the orders and more important families and on the habits of representative species. Daily, except Sat., 9. Credit, one hour. *College of Agriculture, Main 392.* Assistant Professor MACGILLIVRAY.

(b) Laboratory work on the structure, wing venation, and identification of the more common insects. Two practical exercises each week at hours to be arranged. Open only to students taking Course A (a). Credit, two hours. *College of Agriculture, Main 301.* Assistant Professor MACGILLIVRAY and Miss STRYKE.

B. **Elementary Morphology of Insects.** Laboratory work. An elementary course presenting the essentials of insect anatomy. Laboratory open daily except Sat., 8–5. Credit, two or more hours. *College of Agriculture, Main 301.* Assistant Professor MACGILLIVRAY and Miss STRYKE.

Courses Aa and Ab will be accepted as the equivalent of course 3 of the University year.

C. **Elementary Systematic Entomology.** An elementary course giving practice in the determination of insects. Open only to those who have taken or are taking course B. Laboratory open daily except Sat., 8–5.

(a) **Wing Venation.** Laboratory work. A study of the various types of wing venation essential for the identification of insects. Credit, one hour. *College of Agriculture, Main 301.* Assistant Professor MACGILLIVRAY and Miss STRYKE.

(b) **Systematic Entomology.** Laboratory work. The identification of the more important orders and families of insects. The mounting of specimens and their preparation for the cabinet. Open only to students who have taken course C (a) or its equivalent and are registered for two hours of this course. *College of Agriculture, Main 301.* Assistant Professor MACGILLIVRAY and Miss STRYKE.

D. **Advanced Systematic Entomology.** Laboratory work. A training course in the identification and interpretation of obscure characteristics used in the classification of insects. Laboratory open daily except Saturday, 8–5. Credit, three hours. Open only to those who have taken course C. *College of Agriculture, Main 301.* Assistant Professor MACGILLIVRAY.

E. **Classification of the Coccidae.** Laboratory work. A course designed to familiarize the student with the more injurious species of scale insects, the methods of preparing specimens for study, and the systematic arrangement of the species. Laboratory open daily except Saturday, 8–5. Credit, five hours. Open only to those who have taken course D. *College of Agriculture, Main 301.* Assistant Professor MACGILLIVRAY.

F. **Research in Systematic Entomology.** Special work arranged with reference to the needs and attainments of each student. The summer is the best time of the year for the collecting and study of many phases of insect life. An especial opportunity will be given those who desire to study the immature stages of insects. Laboratory open daily except Sat., 8–5, Sat., 8–1. Credit, one or more hours. Open only to those who have taken course C. *College of Agriculture, Main 301.* Assistant Professor MACGILLIVRAY.

HOME ECONOMICS

All work is on the third floor of Main Building, College of Agriculture.

A. **Foods.** Lectures and recitations. Except Sat., 8. Laboratory practice M W F., 10–1. Credit, three hours. Miss ROSE.

A course for establishing a fundamental knowledge of foods. The lectures will include a discussion of the sources, composition, and characteristics of food-stuffs; principles governing the selection of foods and methods of preparing them; food preservation; comparative nutritive value and cost of various foods; selection, planning, and serving of well balanced meals. The laboratory work will follow the lectures closely and will consist of experiments in determining the characteristics of food-stuffs as these relate to the preparation of food and to practical problems of cookery.

B. **Human Nutrition.** Lectures and recitations daily except Sat., 9. Laboratory practice T Th., 10–2. Miss ROSE. Credit, three hours.

The lectures include a discussion of the methods of investigating dietary problems; the practical means of applying scientific principles in planning family and institution dietaries; consideration of special problems of nutrition as in infant feeding and feeding in cases of abnormal nutrition. The laboratory work will include practice in planning and preparing dietaries of various types.

C. **Principles of Household Economy.** Except Sat., 8. Credit, two hours. Miss VAN RENSSELAER.

a. Domestic factors in cost of living; waste, social and individual; production and distribution; exhaustion of supply; adulteration; standards of living; extravagance; effects of cost of living; b. cost of food, shelter, clothing; wholesale and retail prices; marketing; c. family budgets; distribution of income; keeping accounts; savings and investments; d. domestic service; wages and hours of labor; cost of employment; relation of the employer to the employed; training for the unemployed; e. the house: location; plan; furnishing; keeping clean; amenities of household life.

D. **Household Sanitation.** Except Sat., 9. Credit, two hours. Miss VAN RENSSELAER.

Household bacteriology; cleanliness of soil, air, water, food; disposal of waste; the laundry; preservation of food supplies; insects, a source of disease; infection; immunity; methods of disinfection; care of sick; good housekeeping in relation to public health; healthful living to promote efficiency; physical exercise and rest.

INDUSTRIAL EDUCATION

Including courses in Manual Training, Drawing, and Handicraft

The subject of industrial education is broader than generally assumed. It means more than the mere teaching of shop work and drawing. It suggests a scheme of education which will make it worth while for all children to remain in school, and which will provide for the children of the masses and for those who enter the great manufacturing and constructive industries something equivalent to what the State is doing for those who enter the professional and managing activities of the country.

We are all aware that many boys and girls do not have opportunity to enter employments that contribute to their development in any sense of the word, either physically, morally, or intellectually, but drift about from one unskilled occupation to another, gaining little or nothing in efficiency.

It is believed that the right sort of hand work and drawing, combined with the proper treatment of book work, will give these children the proper training to prepare them to enter some branch of actual industrial work.

Many manual training teachers are taking this broader point of view of their work and its relation to the other school work, and are endeavoring to fit themselves for the field of industrial education. Some of these teachers are weak on the technical side, while others fail to grasp the pedagogical phase of the work.

The growth of the industrial education movement is significant. The program of every institute, convention, and association of school men now gives a prominent place to the subject. State laws relating to it have been passed by New York, Massachusetts, Wisconsin, New Jersey, and Connecticut.

Legislative action in reference to industrial and agricultural education is under discussion in nearly every state in the Union. A great national movement along lines of education for efficiency is under way. Manual training, cooking, sewing, drawing, etc., are to become more than subjects within a school curriculum, they will be a part of a new system of education.

For such reasons the University through this department of the Summer Session offers strong courses in education, hand work, and drawing, believing that the success of this work in the past five years warrants the expansion of these courses into a well coordinated Department of Industrial Education.

Equipment

The shops and drawing rooms of Sibley College are among the largest and best equipped in the country. They are being used regularly by 1200 students and can accommodate 1500. They are at the disposal of the students of the Summer Session, who have the further advantage of seeing the regular instruction given to Sibley College students. They include a machine shop, a foundry, a blacksmith shop, a wood working shop, and many drawing rooms, lecture rooms, etc. The shops are exceptionally well supplied with machines and tools for complete instruction in the various subjects. Within the past year the wood working shop has been entirely re-equipped and several new and expensive machines have been added to the machine shop.

A portion of the equipment has been re-arranged and adapted for the special needs of teachers of manual training, drawing, and arts and crafts.

Teachers

The faculty of this department is made up as follows. 1. Six teachers of shop work and drawing selected from the regular faculty of Sibley College. Every one of these men is a trained specialist and an experienced teacher. 2. Three teachers of handicraft and drawing selected from the teaching corps of cities noted for their excellent handicraft work. 3. Three professors from the University who will adapt their usual presentation of subject matter to the needs of teachers in schools of manual training and industrial education. 4. Five lecturers on the various subjects concerned with a complete treatment of the problem of handwork in the public schools. Each of these men is a recognized authority in his special field.

Admission

The courses are open to men and women, and will meet the needs of: (a) teachers and supervisors of industrial arts, handwork, and drawing who wish to perfect themselves in technical skill and professional study; (b) men or women who have teaching experience, or who possess technical ability and wish to qualify as teachers of these subjects; (c) teachers of the State of New York who wish to qualify for the state examination in drawing and manual training as outlined by the State Education Department; (d) school superintendents, principals of schools, and teachers who wish to acquaint themselves with the methods and practices of industrial education through the lectures and conferences.

There is no examination for admission to the Summer Session. Each person must, however, satisfy the instructor in charge of a course that he is qualified to pursue the work of the course. For University credit see page 7; for tuition and shop fees see page 7.

Daily Program

The shops and drawing rooms are open daily and until noon on Saturday. The lectures for this department are given between 12 and 1 every day except Saturday. Ten conferences will be held during the Session. These will occur on Wednesday and Friday evenings. The University library for reading and original work in this department is available to the students who desire to examine the books, pamphlets, and reports referred to in the lectures and conferences.

COURSES OF STUDY

It is believed that some knowledge of the principles of education, a definite understanding of tool processes, and the ability to express ideas adequately through the art of drawing, are the professional qualifications which make for efficient teaching of subject matter coming under the head of industrial education. With this aim in view this department offers three definite courses of instruction: 1. education; 2. handwork; 3. drawing.

I. EDUCATION

1. Educational History and Principles. Lectures, discussions, and prescribed readings. Five lectures. Except Sat., 12. *G. S. 142.* Professor DEGARMO.

These special lectures are designed to be an introduction to the general theory of elementary and secondary education upon which any complete study of the special problems underlying industrial education must be based. Special emphasis will be laid upon the teachings of Comenius, Rousseau, Froebel, and Dewey. The doctrines of these educational reformers form the basis upon which rests much of the recent development of handwork in our public schools. The course includes a study of the relationship which should exist between the shop work and the book work in these schools and points out the scientific methods of teaching these subjects. The following are some of the leading topics: the social and the individual basis of elementary and secondary education; the basis for the selection and organization of studies for industrial ends; their function and relative educational worth; the mental discipline that each should furnish; nature and place of induction and deduction in teaching; the means for securing efficiency; function of the laboratory and work-shop; methods of relating industrial to other schools.

Development of Modern Industry. Lectures and conferences. 12–1. *G. S. 142.* Professor KIMBALL.

Seven lectures treating of the development of modern industry. Manufacturing processes have changed to such an extent that teachers of handwork need some knowledge of modern methods of manufacturing if they are to attempt to prepare young people for industry. Some of the topics treated will be the influence of automatic machines upon manufacturing methods, the economic problem of production and distribution, and welfare work in the modern factory.

Vocational Training for Women. Lectures and conferences. Training in home economics will be the central theme. The relations of this work to the school program and to other studies, and the various problems of organizing it will be treated. 12–1. *G. S. 142.* Miss ROSE and Miss VAN RENSSELAER.

The Problems of Industrial Education. Lectures, prescribed readings, and conferences. 12–1. *G. S. 142.*

These lectures, forming the center about which the general scheme of lecture work is arranged, will be given by men who are prominent in this field of education. Each of these men will spend two or three days at the University, and during this residence will give one or more lectures and will conduct an evening conference.

With the background of educational philosophy and history as given in the courses of Professors De Garmo and Kimball, and Misses Van Rensselaer, and Rose the teachers will be ready to take up the definite problems of industrial and trades schools as presented in this course.

These lectures will treat of such topics as: 1. the development of the teaching of mechanic arts and industrial training in our public schools; 2. the purpose and scope of the manual training high school; 3. the relation of manual arts and drawing; 4. the present movement towards elementary industrial schools and secondary trade schools; 6. the half time schools; 6. the apprenticeship systems; 7. continuation schools; 8. attitude of labor unions; 9. agricultural education; 10. various state laws relating to industrial and trades schools.

II. HANDWORK

2. **Manual Training for the Lower Grades.** A course in handwork adapted to the first six years of the elementary school. The following processes and materials will be made use of and typical projects in each will be carried out: construction work in paper and cardboard; weaving, reed and raphia work, basketry; block printing and stenciling; simple book binding; blue printing; elementary metal and wood work. This course is offered to meet particularly the needs of the regular grade teacher, and to be of help to the special teacher of art and manual training who wishes to become familiar with the problem of hand work in the elementary grades. Exc. Sat., 2–4. Mr. Wood.

3. **Wood Work for the Elementary Schools.** A course employing a comprehensive set of bench tools adapted to the upper grades of the grammar schools, each model considered with reference to form, fitness, and decoration. Methods of presentation and execution. This course is intended to equip a capable but inexperienced person for a position as teacher. 8–11 daily. Mr. McCready.

4. **Wood Working for Secondary Schools.** A course which aims to prepare for the teaching of wood work in the secondary scools. It includes the study of joinery, furniture making, structural design, and decoration. Concrete problems involving the principles of the work will be suggested by the teacher and carried out by the class. The individual will have considerable latitude in the choice of the particular project and in the design and decoration for the same. Particular attention will be paid to design. Except Sat., 2–5. Mr. McCready.

5. **Shop Lectures and Conferences.** Lectures and conferences on the organization and supervision of manual training, methods and materials, equipments, costs, courses of study, and practical talks on subjects of importance to the manual training teacher, woods and wood-construction, lumber and forestry, wood finishing, etc. T Th, 4–5. Mr. Wood.

6. **Foundry Work.** The course begins with instruction in tempering the sand and making green sand moulds for small work. Following this come exercises in core-making, and an explanation of loam work. Machine, floor, and sweep moulding are briefly described. Castings are made in cast iron, and the students are taught to operate the cupola furnace. Mr. Vanderhoff.

7. **Forging for Secondary Schools.** This course includes systematic instruction in the use of each tool as it is taken up, the study of each material worked, with an explanation of its various grades, the proper method of treatment for each, and the discussion of the methods of making large forgings. The ground covered includes instruction in the building and care of fires, heating, drawing, forming, bending and twisting, upsetting, upsetting while bending, upsetting for square corners, punching, bolt making, welding, including careful instruction in scarfing for the various welds, the making and use of heading tools, chain making, the making and fitting of braces, the construction of hooks and ring bolts, riveting and the use of threading tools. Training is also given in the use of the power hammer. The work in steel includes drawing, forming, welding and tempering, and spring and tool making. Mr. Head.

8. **Machine Work for Secondary Schools.** The different measuring tools and devices, with the advantages, methods of use, and limits of accuracy of each are considered. Each cutting tool is taken up, its cutting angles and general adjustments are discussed, together with the feeds and cutting speeds suitable for each material worked and for each machine. The course includes instruction in centering, squaring, straight and taper turning and fitting, outside and inside screw cutting, chucking, reaming, finishing and polishing, drilling, tapping, mandrel making, grinding and lapping, boring, brass turning and finishing, ornamental turning, planing flat and V surfaces, fitting the use of the milling machine, gear cutting, tool making, including taps, drills, reamers, milling cutters, and cylindrical gauges. Mr. WELLS and Mr. HOWE.

III. DRAWING

9. **Freehand Drawing for Elementary and Secondary Schools.** A course to meet the needs of the public school teacher. This will include methods of drawing in such phases of the subject as the teacher must meet and in the common mediums, as pencil, crayon, and charcoal, the study of design for its public school value, combined with talks on methods of presenting these subjects in the class rooms.

The relation of art to handwork will be considered, and the study of design will be made applicable to constructive problems. Except Sat., 8–11, *Sibley 202*. Mr. GRIFFITH.

10. **Mechanical Drawing for Secondary Schools.** This course is designed for those who wish to teach mechanical drawing in secondary schools and for those who feel the need of a more complete knowledge of this subject in order to assist them in teaching shop work. Some of the topics covered are use of instruments, lettering, orthographic and isometric profection, inking, tracing, conventions, and working drawings. Students familiar with these topics can elect a more advanced course. *Sibley 102*. Mr. WILLIAMS.

EVENING CONFERENCES

A series of round table conferences was held during the last two summers. They proved remarkably successful in bringing together in an informal way all persons closely connected with this general field of education. The special problems of each student were taken up and discussed in the light of the combined experiences of all present. There will be ten of these gatherings of students, shop instructors, and lecturers this year. Professor KIMBALL will have the general supervision of them, and the lecturers in course 1 will act as leaders, each on the evening devoted to his special topic.

The following subjects are proposed for discussion. Vocational training for the age period between 14 and 16. The problem of the technical high school. The meaning of industrial education to the elementary schools. Women in industry—a problem in industrial education. The manufacturer's view point. The workingman's view point. The corporation school. Normal schools for training industrial teachers. The co-operative system of education. The philosophy of industrial education in the agricultural community.

SHOP-WORK AND DRAWING FOR ENGINEERING STUDENTS

Drawing

For further information regarding course C, apply to Mr. Pond; for information regarding the drawing and shop courses apply to Professor Kimball, 205 Sibley.

A. **Mechanical Drawing.** A course in drawing for beginners, covering use of instruments, orthographic and isometric projection, inking, tracing, conventions, working drawings, 8–11 M W F., and 2–5 p. m. except Sat., *Sibley 203.* Mr. WILLIAMS.

B. **Machine Sketching and Drawing.** A more advanced course in mechanical drawing for those who have had the equivalent of course A. Sketching of machine parts, machine drawing from sketches, empirical design. This course is an application of the work in course A to such machine designing as can be done without a knowledge of mechanics. 8–11 M W F., and 2–5 except Sat., *Sibley 203.* Professor KIMBALL and Mr. WILLIAMS.

C. **Descriptive Geometry.** Lectures or recitations daily except Sat., 8. Drawing, daily except Sat., 9–12. *Lincoln Hall.* Assistant Professor POND.

Equivalent to descriptive geometry of course 1 as given in the regular college year, and accepted for the descriptive geometry required in Sibley College and in the College of Civil Engineering. Those who require Sibley credit do not need to take the whole course.

Shop Work

A. **Pattern Making.** Use of woodworking tools; elements of pattern making. Mr. HOOPER.

B. **Foundry Work.** Moulding, casting, mixing of metals, operation of cupola, etc. Mr. VANDERHOFF.

C. **Forge Work.** Forging, welding, tempering, etc. Mr. HEAD.

D. **Machine Work.** Use of measuring tools; hand and machine tools; fitting and assembling. Each of the above daily except Sat., 8–11, 1–5, and Saturday, 8–1. Mr. WELLS and Mr. HOWE.

E. **Principles of Manufacturing.** Must be taken with course D. Theory of measuring and elementary theory of manufacturing; cost and time keeping systems, etc. Lectures, M T W Th., 11. *Sibley 105.* Mr. WELLS.

F. **Manual Training.** The scope of the above courses in shop work is the same as that of the corresponding courses given to the regular Sibley College students. They are intended for prospective or actual engineering students. In addition to these, special courses are offered in each shop, designed to meet the wants of manual training teachers, and given in close connection with the technical work of manual training. (See pp. 49, 50.) Teachers having special needs may have courses made up to suit their wants. At the same time it is greatly to their advantage to see the work as given to the regular engineering students.

MECHANICS OF ENGINEERING

A. **Mechanics.** Equivalent of the first term of course 20, College of Civil Engineering. Admission to this course is restricted to those already having a fair knowledge of the subject. Students in Cornell University engineering

courses are not admitted to this course, unless they have taken the first term of course 20 in University classes during the regular year and received a mark of at least 41. Lectures, recitations, and problems, two hours daily except Sat., 8–10. *Lincoln Hall 32.* Assistant Professor RETTGER.

B. **Mechanics.** Equivalent to the second term of course 20, College of Civil Engineering. The restrictions are the same as in course A above.

Recitations, lectures, and problems. Daily except Sat., 10–12. *Lincoln Hall 32.* Assistant Professor RETTGER.

BRIDGE AND STRUCTURAL ENGINEERING

C. E. 72. **Reinforced Concrete Arch.** Credit, two hours. Preparation required: Mechanics 20, and that portion of course 71 dealing with elementary graphic statics. The design of an arch of reinforced concrete including the abutments and centering. Lectures, computation, and drawing. Except Saturday, *Lincoln Hall, 27 and 29.* Assistant Professor DERICKSON.

C. E. 77. **Concrete Construction.** Credit, three hours. Preparation required: Mechanics 20. Text-book, Principles of Reinforced Concrete Construction by Turneaure and Maurer. The object of this course is the study of the fundamental principles underlying the rational design of reinforced concrete structures including centering. Except Saturday, 9–12.30, *Lincoln Hall 22 and 29.* Assistant Professor DERICKSON.

HYDRAULICS

The work in hydraulics given in the Summer Session is intended to cover the same ground as is covered during the regular term in courses 23 and 24, the former being the required work for students in Civil Engineering and the latter corresponding to the required work for students in Sibley College.

Course A. Hydrostatics; measurement of pressures; strength of pipes; dams and retaining walls; earth pressures; immersion and flotation; pneumatics of air motors and compressors; barometric levelling; etc. Daily except Saturday, 12, *Lincoln 26.* Assistant Professor SEERY.

Course B. Hydraulic motors and flow of water through pipes, orifices and over weirs; fluid friction and loss of head; general applications of Bernouilli's Theorem; steady flow in open channels; use of Kutter's and Church's Diagrams; hydraulics of machinery; waterwheels; impulse wheels; reaction turbines; theorem of flow through rotating casing; power, speed and discharge of turbines; theory of testing of motors; etc. This course corresponds exactly to C. E. 24 and the Sibley course in hydraulics. Daily, 8, *Lincoln 26.* Assistant Professor SEERY.

Students desiring to cover the work of C. E. 23 will be required to attend both of these classes and meet eleven times a week. The same restrictions apply to taking C. E. hydraulics in Summer Session as have been prescribed for C. E. mechanics; in exceptional cases men have been allowed to take hydraulics for the first time in Summer Session provided no other work be taken. These restrictions do not apply to the Sibley course.

Students who contemplate taking hydraulics in Summer Session should register in advance with Assistant Professor SEERY, *33 Lincoln.*

AGRICULTURE

In view of the wide-spread demand that instruction in the sciences applied to Agriculture should be introduced in the public schools of the state, it has been decided to include this subject in the work of the Summer Session for 1911.

The extent and scope of the work to be offered cannot be announced until the middle of April. At that time a special pamphlet describing the courses in agriculture will be issued, and will be sent to all persons who ask for it specifically, and to all those who, in writing for information regarding the Summer Session, have indicated their interest in this subject.

In the present Announcement of the Summer Session there are several courses in the various sciences which are applied in agriculture and a knowledge of which is indispensable for the teacher of agriculture. Such courses are: course 7 in physics (p. 27); the courses in chemistry (pp. 30-32); in geography (pp. 33 and following); in geology (p. 37); in nature-study (p. 39); in zoology (p. 40); in entomology (p. 44); and some of the work in industrial education (pp. 46-49).

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OFFICIAL PUBLICATIONS OF CORNELL UNIVERSITY

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These publications include the annual Register and the Book of Views, for either of which a charge of twenty-five cents a copy is made, and the following publications, any of which will be sent gratis and post-free on request:

General Circular of Information for prospective students,
Announcement of the College of Arts and Sciences,
Courses of Instruction in the College of Arts and Sciences,
Announcement of Sibley College of Mechanical Engineering and the Mechanic Arts,
Announcement of the College of Civil Engineering,
Announcement of the College of Law,
Announcement of the College of Architecture,
Announcement of the Medical College,
Announcement of the New York State College of Agriculture,
Announcement of the Winter Courses in the College of Agriculture,
Announcement of the New York State Veterinary College,
Announcement of the Graduate School,
Announcement of the Summer Session,
Annual Reports of the President and the Treasurer,
Pamphlets on scholarships, fellowships, and prizes, samples of entrance and scholarship examination papers, special departmental announcements, etc.

Correspondence concerning the publications of the University should be addressed to

The Registrar of Cornell University,
Ithaca, N. Y.